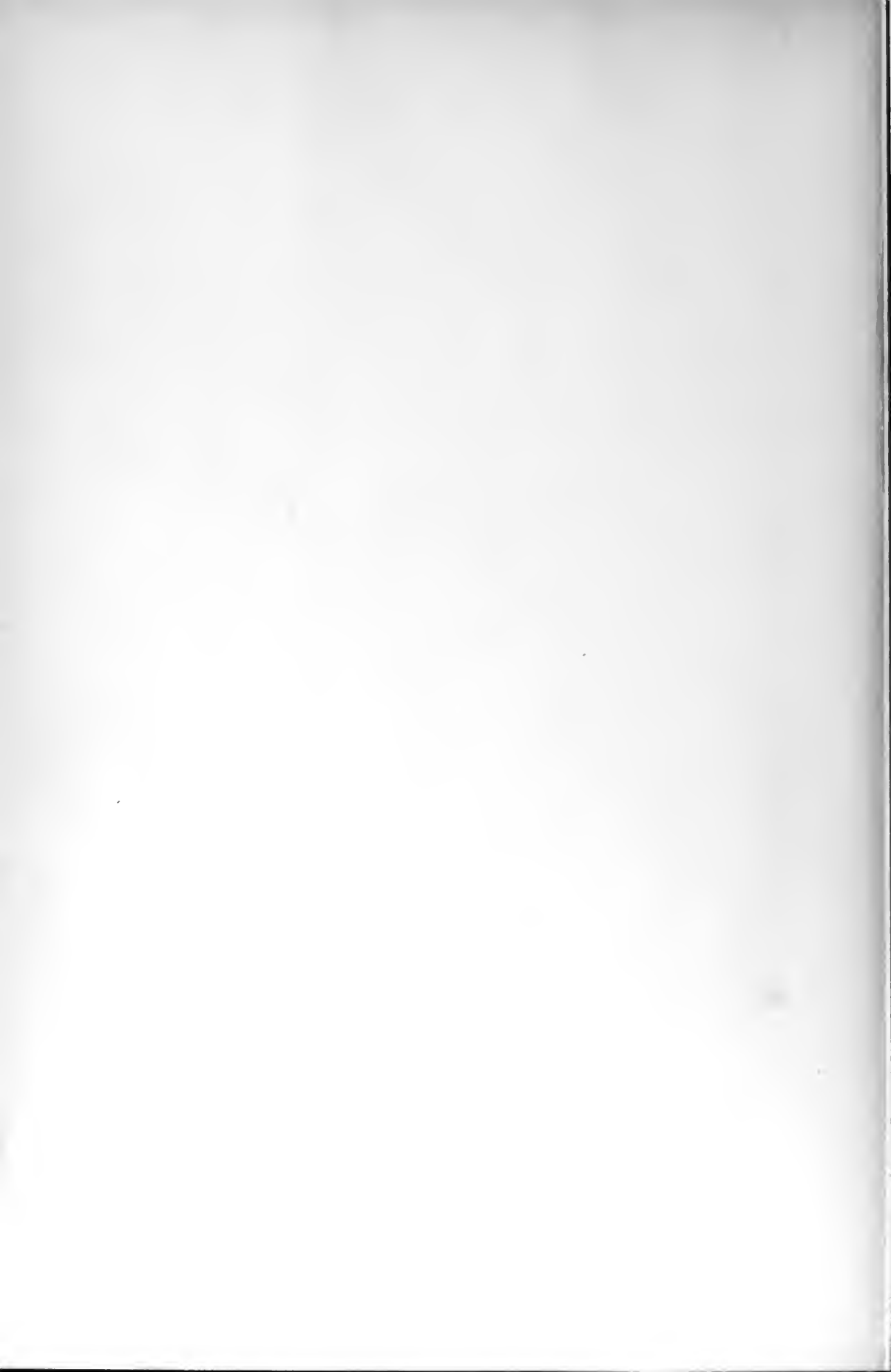
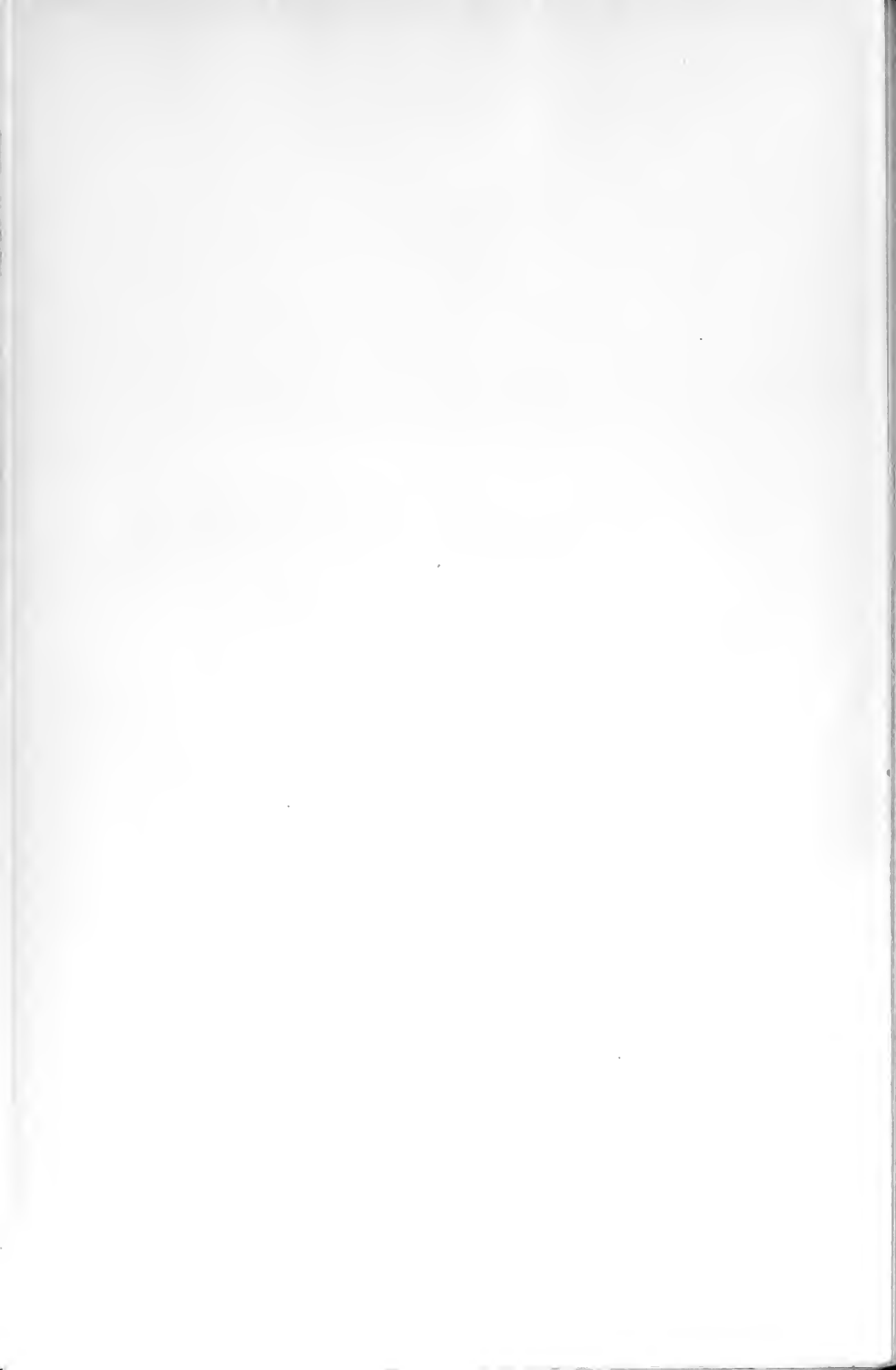


THE BOOK
of
KNOWLEDGE

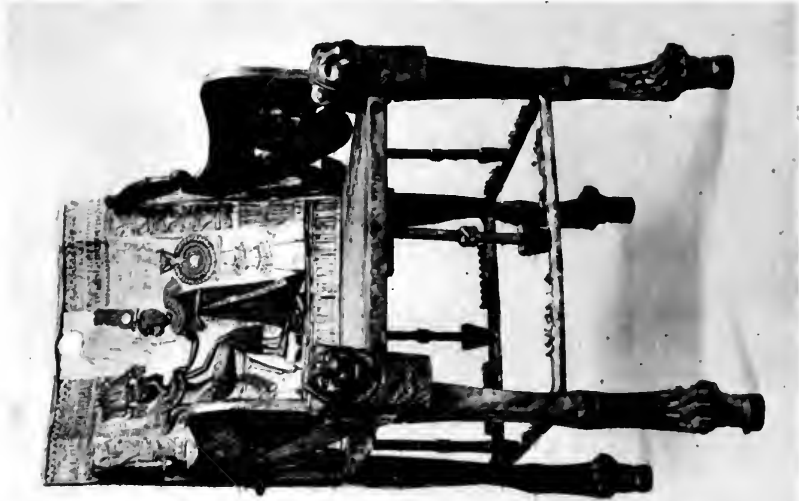








ANCIENT ART TREASURES FROM THE TOMB OF A BOY KING



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WHAT king's name is better known than that of Tutankhamen, yet who can tell very much about his reign? As a mummy he is more famous than he was as ruler. What we know we have learned principally from his tomb, which was found by Lord Carnarvon and Howard Carter in 1922. It yielded an amazing store of treasure—chests and jars, chariots, couches, thrones, miniature boats, daggers and exquisite jewelry. The mummy of the king in a coffin of solid gold, itself a work of art, held costly personal adornments in which gold, jewels and finest enamel are combined. The very sandals are of gold. Slippers and fragments of clothing, as well as the mummy itself, show that the ruler was very young when he died, probably not more than eighteen. The figure of the king, at the left, bears upon the brow the vulture and the cobra, symbols of Upper and Lower Egypt. Head-dress, collar and insignia are in gilt. In the centre you see the coronation throne, overlaid with gold and richly adorned with colored inlay. At the right is one of the curious animals decorating a royal couch; teeth and tongue are of solid ivory.

The BOOK *of* KNOWLEDGE

The Children's Encyclopedia

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DEPARTMENTS

The Earth	The United States
Stories and Legends	Familiar Things
All Countries	Our Own Life
Golden Deeds	The Fine Arts
Helps to Learning	Men and Women
Literature	Poetry and Rhymes
Animal Life	Plant Life
Famous Books	Things to Make
Dominion of Canada	and Things to Do
Book of Wonder	

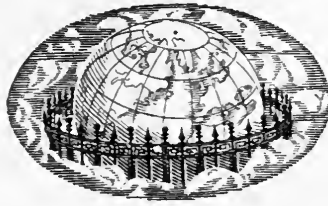
VOLUME III

New York

THE GROLIER SOCIETY
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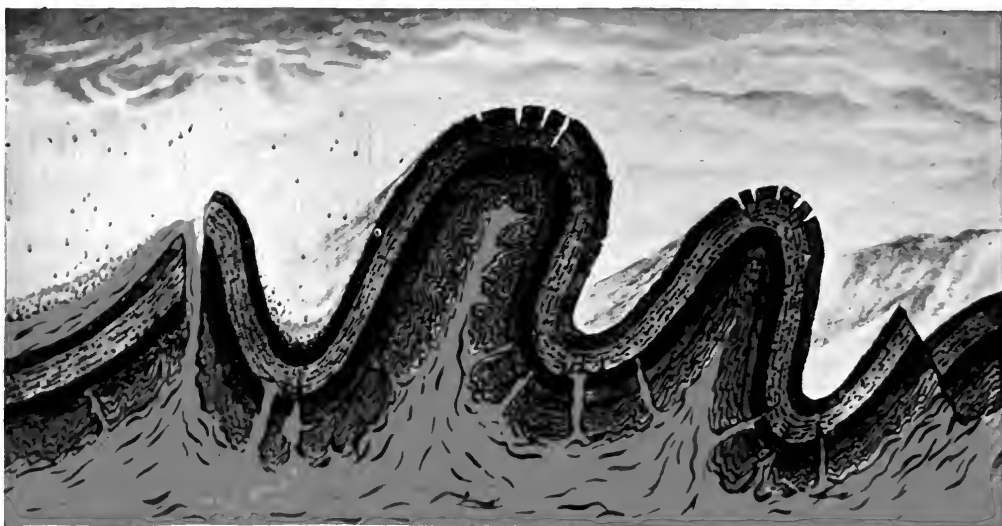
This is a short guide to the principal contents of this volume. It is not possible to give all of the questions in *The Book of Wonder*, or the titles of all of the *Little Verses and Problems*, but in all cases the pages are given where such sections of the book begin. In the big Index, Volume 20, you will find every title and every subject, including the pictures.

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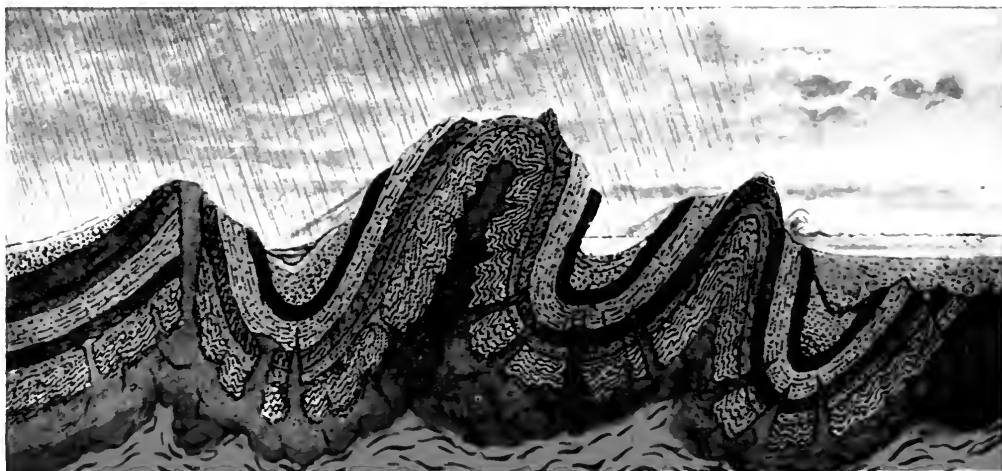
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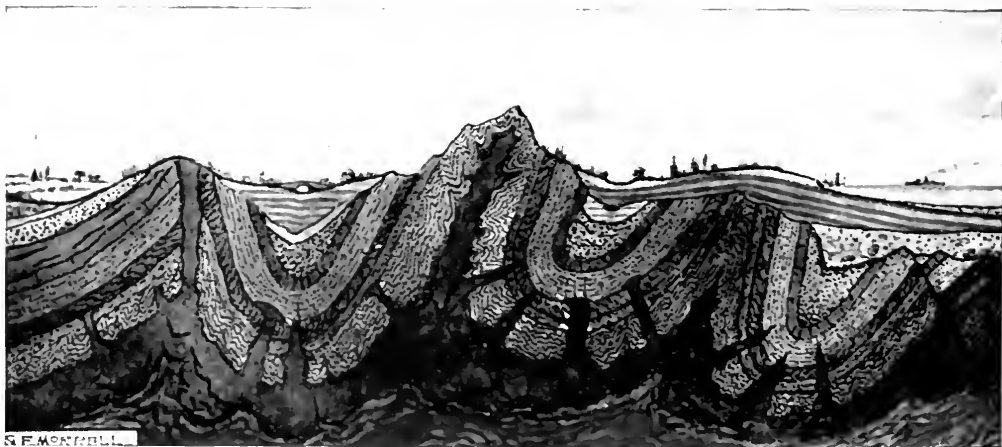
CRUMPLING AND WEARING OF THE EARTH



The great crumples and folds in the early crust of the earth, with molten igneous rock forced into them, and in one place bursting through.



The folds many years later when rain, rivers, frost and wind have greatly worn them down.



REACHMILL

The folds in modern times still more worn down, showing valleys, hills, sea, and soil.

The Book of THE EARTH

WHAT THIS STORY TELLS US

IN this story and those which come after it we are telling you something of the foundations of our country. That is, we are telling of the rocks which are under the soil and in some places come to the surface. The oldest rock which makes the foundations was formed by heat. Therefore it is called igneous rock from the Latin word for fire. This is the rock from which most other rock has been made. When any rock is exposed to the action of water, air and other gases it wears down into mud, clay or sand. These in turn may be changed by heat and pressure into sedimentary or stratified rock, which means "settled" or "spread out." Where the degree of heat is very great these substances may be changed into crystalline, or metamorphic, rocks from the Greek words which mean "changed form." There are other rocks such as the limestones and chalk made from the shells of tiny sea creatures. As you will find all rocks are not of the same age, and we shall tell you of this order in which the various stratified rocks were formed in nature's laboratory.

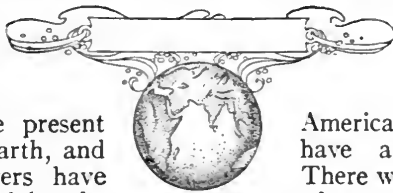
FOUNDATIONS IN AMERICA

WE have seen how the mud in the bottom of the sea was raised to form most of the present solid surface of the earth, and how the various layers have been named and dated by the fossil plants and animals they contain. And we have briefly described the age and contents of the main layers or strata from the Cambrian rocks up till the present time.

Now, America has been in existence for many ages. Mountains have been washed away here and there, and plains made valleys, and valleys made into arms of the sea. At different places different layers of rock have been laid bare, and the general surface has become a tessellated pavement or patchwork or strata of all kinds and ages. Over this rock may have crawled or swum trilobites of Cambrian and pre-Cambrian times. Along that road giant lizards may have waddled. Above that field the archæopteryx may have flown. In the soil of that garden there may be dinosaurs.

By studying our book every child may know something of the age and the geological history of the soil of his garden, whether he lives in Seattle, Washington, or Miami, Florida; in Montreal, Province of Quebec, or in Winnipeg, Manitoba.

The oldest rocks that contain recog-



nizable fossils are the rocks called the Cambrian. But in many places in America the Cambrian rocks have all been worn away. There we can see rocks millions of years older—rocks that were there probably millions of years before life appeared.

The Laurentian Plateau, which forms more than half of Canada, and the circular complex of the Adirondacks are two of the oldest pieces of land in existence. The rock there is chiefly the rock known as *gneiss*.

This is crystallized rock, and presents a great problem to geologists. It is possible that, like the rocks formed later, it is mud or sedimentary rock, and has been crystallized simply by heat and pressure. It is even possible that it has never yet been worn down into mud, and that it represents some of the actual material of which the crust of the earth was already made. Many geologists believe that it is in some places really lava which had been forced through earlier sedimentary layers of the crust. Anyhow, it is the deepest part of the crust of the earth that nature has allowed man to penetrate, and the gneiss may be considered as the foundation of America.

Gneiss, as we have said, is found in the Adirondacks. It is found also in

Vermont, New Hampshire and Maine, and a narrow band runs from Connecticut into northern New Jersey and eastern Pennsylvania. It occurs also over a large part of Canada and forms part of the mountains of Virginia, Georgia and the Carolinas. The gneiss is often mixed with granite and other igneous rocks which have been forced into it. It is particularly interesting in its character as the oldest uncovered rock in the world. But at the time it came to the surface there was probably no life on the earth, and so it lacks the interest of fossils.

We say *probably* there was no life. Graphite and lime have been found in some gneiss rocks, and some geologists think that these were of organic origin—possibly the remains of sea vegetation. In some of the Canadian gneisses, too, certain curious objects were found which were thought to be fossils. The name *Eozoön* was given to the sea creature whose remains they were supposed to be, and though most geologists are now convinced that the object is not a fossil, it is just possible it may be.

Gneiss, then, may be regarded as the backbone and framework of modern North America. Though it is probably not part of the original crust of the earth, it is probably not unlike that crust in its general make-up. It will be interesting, therefore, to see what it is made of.

When we analyze it we find that it is made chiefly of silicon and oxygen, and that in its purest form it occurs as quartz.

THE WONDROUS TRUTH ABOUT A PIECE OF QUARTZ

One of the most interesting and extraordinary things about quartz is the fact that it usually contains vast numbers of minute cavities filled with water. There may be thousands of millions of such cavities in a single cubic inch. Despite its cavities, it is one of the hardest and most enduring of rocks. Even after it has been broken down it remains as pebbles, granite and sand. All the sandstone mountains are built of grains of quartz, and most of the sand is quartz sand.

Amethyst, cairngorm, chalcedony, opal, jasper, agate and some other precious stones are forms of quartz. It is chiefly to the silicon in quartz that we owe flints and prisms, eyeglasses and lenses. So that we have every reason to be pleased with the foundation stones of our land.

Millions of years have elapsed, of course, since our lands were only gneiss. Since that time tremendous masses of the original gneiss have been worn down by rain, rivers and frost into gravel and sand and mud. During the millions of years that have passed, the land has periodically been washed into the sea, and the mud in the sea has risen again as mountains and solid land. In the sea, too, little sea creatures have collected the silica and the lime from the ancient rocks. These have been separated from the rest of the mud, and the collected separated lime has risen from the sea as new land.

The land has been continually molded and remolded. Here a mountain has been rubbed away. Here a new country has been plastered on. Here a volcano has poured forth its basaltic lava. Here the lava has been worn away into causeways and columns. So now we have the surface of America, piled deep with recent rocks in one place, and rubbed away in another till pre-Cambrian rocks show.

THE PICTURE GEOLOGY AND THE GREAT TALE IT TELLS US

The story of each great sedimentary layer and what it has to teach us of the life and conditions in America during that particular geological period, is told in the great series of pictures and maps to which we now come in our geological study of the earth. The course of our very rapid survey will cover hundreds of millions of years.

This picture geology opens with the color plate facing page 773, on which are three pictures. The first picture shows the tremendous folds into which early stratified rocks of the earth were thrown as the crust cooled and crumpled.

The second picture shows the folds after millions of years of rain, wind and frost have worn them down into rugged mountain ranges. At some such stage as this, life appeared.

The third picture represents the condition of things still later in modern times. Now the sun, wind, rain and frost have worn down the folds into the hills and valleys.

America is a splendid country geologically, for the whole geological record, from the oldest to the earliest rocks, can be studied on its surface. Every one of us who has a garden and a home has a museum and a book of geology.

THE NEXT STORY OF THE EARTH IS ON PAGE 905.

THE OLDEST ROCKS IN NORTH AMERICA



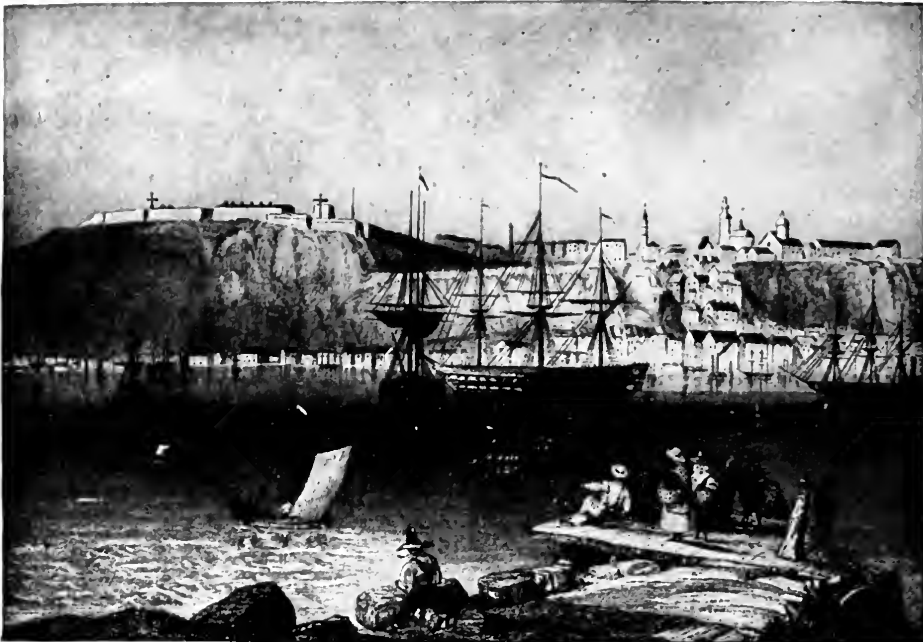
MONTMORENCY FALLS, QUEBEC



GRAND DISCHARGE, HEBERTVILLE, QUEBEC

These rocks form a part of the Laurentian Plateau in Quebec. Geologists say that in this region is the largest area of the oldest rocks visible anywhere in North America. Not very much of this ancient rock is on the surface in the United States, though there are small outcrops here and there.
Photos, Canadian National Railways.

OLD QUEBEC AND ITS CAPTOR



Quebec was founded by Champlain in 1608, and after it had been fortified, the French thought it could not be captured. When General James Wolfe was sent to take the town, in 1759, he thought out a way which proved successful. This was to move his troops upstream and climb the cliffs behind the city. Quebec was taken. Both commanding officers, Wolfe and Montcalm, were killed in the battle.



During the night of September 12, 1759, the troops scrambled up a steep path, and in the morning were ready for battle. The French general, Montcalm, attacked, but was defeated. Both he and Wolfe were fatally wounded. The city surrendered. As it was the strongest place the French had, peace was soon made, and France lost her American possessions. Not an acre of land was left her on the continent.

From old prints

THE HISTORY OF THE UNITED STATES

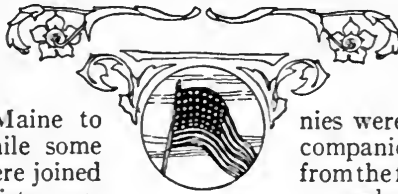
WE have learned that Spain, England, France, Holland and Sweden all tried to plant colonies in North America, and that Sweden and Holland were forced out, leaving the three nations first named in possession. The Spanish colonies were in the far South, and continued to belong to that power for a long time, but we shall learn in this article how France and England struggled for the rest of the continent, and how France lost every foot of land she owned on the mainland. Canada and the territory she claimed east of the Mississippi went to England, and the territory west of the great river was turned over to Spain. Only two tiny islands off Newfoundland were left to France.

THE STRUGGLE FOR THE CONTINENT

WE have already learned that Englishmen planted many colonies on the Atlantic coast from Maine to Florida, and that, while some were divided, others were joined together until at last thirteen remained. In the meantime the French had not been idle, as we learned in the second article. They built forts and towns upon the St. Lawrence River, in Nova Scotia, which they called Acadia, and on the Great Lakes. They explored the Mississippi River down to the Gulf of Mexico and sent out many missionaries to try to make Christians of the Indians. Sweden and Holland had been forced to give up the colonies they had planted, and besides Great Britain and France, only Spain remained.

THE ENGLISH BUILD HOMES IN THE
NEW LAND

But there was a great difference in the kind of colonies that were planted. The English built homes in the new country and expected to spend their lives in their new homes. In all their colonies most of the people cultivated the ground, though in some of them fishing was also very important, and the New England colonies built many small ships in which they carried dried fish and timber to other English colonies, or to the French and Spanish colonies, and even to Europe. England left the colonies very much alone at first and the people learned to govern themselves and to be proud of



their colony or province, as it was sometimes called.

The French colonies were generally sent out by companies which expected profits from the fur trade. They did not care whether the colony grew or

not if they could get many soft furs which they could sell at a high price. Some wise men tried to settle permanent colonies, but they were not supported and the colonies did not grow strong, as the English colonies did. Then, too, those in power in France sent out long lists of rules which had to be obeyed. The settlers had little liberty, and some pushed on into the Indian country where the rules could not follow them.

THE FRENCH COLONISTS EXPECTED TO
RETURN TO FRANCE

Another great difference was this. English women came out from the first, and most of the settlers expected to live all their lives in the country. Very few French women came out, and many of the Frenchmen married Indian wives. Their children were more Indian than French, and they did very little to build up the French power. The Frenchmen who did not marry expected to go back to France some day when they had become rich, and so did not do much to make the country strong. They lived in the woods like Indians, and traveled far and wide—trapping animals, or buying their skins from the Indians.

The French knew better how to make friends with the Indians than the English did. The English despised them and almost destroyed some Indian tribes, such as the Pequots, the Tuscaroras, and King Philip's men, who were called Wampanoags or Pokanokets. Some of the colonies offered rewards for Indian scalps. The French were friendly with all the Indians except the Five Nations. You remember how Champlain's mistake cost the friendship of these warriors. An Irishman named Sir William Johnson, who lived in the Mohawk Valley, had more influence with them in later years than anyone else and made them help the English.

THE JESUIT MISSIONARIES IN NEW FRANCE

One reason for the friendship of the Indians toward the French was the great number of missionaries who visited all the tribes. The most important were the members of the Society of Jesus, which is a society in the Roman Catholic Church. They were called Jesuits. Father Marquette and Father Jogues were two of the best known. Many of these missionaries were tortured by the Indians, but as fast as one was put to death another stepped forward to fill the place; and at last their preaching had some effect, except with the Five Nations, who would not listen to them because they were French. As both powers grew in America, the French determined to settle the Mississippi Valley, which they claimed because Father Marquette and La Salle had explored that great river. If they could build forts and place settlers in the valley, they could keep the English east of the Alleghany Mountains. If you will turn to your map, you will see how narrow that strip of territory is when you compare it with the Mississippi Valley. Real fighting began in 1690, though the year before the governor of New York had stirred up the Five Nations to make a fierce attack upon the Canadian village of Lachine.

Spain was not so powerful as two hundred years before, and France and England were almost constantly at war, trying to settle which was the stronger power in Europe, and fighting took place in America as well as in Europe. The first of these wars was known in America as King William's War, because William III was reigning in England at the time. A

party of French and Indians burned the town of Schenectady, New York, in 1690, killed 60 persons and took 30 prisoners. A small town in New Hampshire and a fort in Maine were also taken, and the people massacred. In 1690, however, the English and the New Englanders captured Port Royal in Acadia but failed to take Quebec. The Five Nations made many raids upon the French, and we tell of one of these in the story of Madeline de Verchères. At the end of the war each power gave back all the places it had taken.

THE BRAVE MRS. DUSTIN AND HER TERRIBLE EXPERIENCE

During this war a farmer named Dustin was at work in a field near Haverhill, Massachusetts, with seven of his children around him. When he heard the terrible war whoop one day, he seized his gun and kept the Indians back until he and the children reached a fortified house. At his own home the Indians killed his baby by throwing it against a tree, and took Mrs. Dustin and another woman with them. A white boy, who was also a captive, told Mrs. Dustin that they were all to be tortured when the party, which was made up of nine men and boys and three squaws, reached the end of the journey. One night when all the Indians were asleep, Mrs. Dustin, the other woman and the boy very quietly got hold of tomahawks and killed ten of their captors. One squaw and a boy escaped. Then Mrs. Dustin scalped the ten Indians to prove her story, and the three made their way back home, over a hundred miles through the forest. The government paid Mrs. Dustin a large sum of money for the scalps.

QUEEN ANNE'S WAR GIVES ACADIA TO ENGLAND

The war which broke out again in Europe in 1702 was called in America Queen Anne's War, and many towns were captured by the French with the aid of the Indians. At Deerfield in Massachusetts, in 1704, about fifty whites were killed and over a hundred were captured. If any of the captives could not keep up as they were being taken away, they were tomahawked and scalped. Later some of the Deerfield captives were ransomed, but others had been adopted into the tribe and had grown to love the life in the wilderness so much that they refused to return to their families.

Haverhill was also attacked by the French and Indians and many people were killed. Later, in 1710, the English captured Port Royal again, and named it Annapolis in honor of the queen. At the end of the war (1713) the town was kept by the English, and all Acadia, or Nova Scotia, as well, besides the country around Hudson Bay. France had now lost much territory, but was still powerful in America. In this war there was also some fighting between South Carolina and Florida, as Spain was helping France.

There was no open war between the

under William Pepperell sailed to attack the fort in 1745, and with some help from a British fleet, took the fort and gained a large stock of powder and other ammunition. This was a very important event, for it showed how the English colonists could fight. The fort, however, was given back to France when peace was made at Aix-la-Chapelle in 1748.

By this time the English colonists were beginning to think that they would soon need the land across the Alleghany Mountains. The English kings had granted to Virginia, Massachusetts, Connecticut and Carolina the land from sea to sea, and the



From an old print.

ESCAPE OF THE DUSTIN CHILDREN

A farmer named Dustin was working on his farm near Haverhill, Mass., with his children around him when he discovered the Indians. He seized his gun and was able to keep them back, while he and the children retreated. You may read of what happened to his wife, and of her brave deed, on the opposite page.

French and English for more than thirty years now, though the people of New England believed that the French encouraged the Indians to make attacks upon the careless settlers. The war which was being fought in Europe finally reached America in 1744, where it was generally known as King George's War.

KING GEORGE'S WAR PROVED THAT THE COLONISTS COULD FIGHT

The French had built a very strong fort at Louisbourg, on Cape Breton Island, and thought it could not be taken. A force of about 4,000 New Englanders

grant of Pennsylvania extended beyond the mountains. New York also claimed some of the western lands. Though the waters of Lake Champlain flowed into the St. Lawrence River, the lake itself and the land around it were easier to reach from the English colonies than they were from the French. The English wished to settle the land, but the French wished to keep it open and uninhabited for the sake of the fur trade. Settlers always make the wild animals scarcer. Everybody realized that peace could not last long, and both sides prepared for a fight.

THE DIFFERENT CLAIMS TO THE VALLEY OF THE MISSISSIPPI

In the valley of the Ohio River was much game, but few Indians lived there. Pennsylvania claimed a part of the land, and Virginia also said that it was a part of the territory which had been granted by James I. The French said that since the Ohio flowed into the Mississippi, all the land belonged to them because of the voyages of La Salle. In those days a nation which occupied the mouth of a river always claimed all the land from which water ran off into that river or any of its branches.

The French began in 1749 to send men all through the region to raise the French flag and to bury lead plates on which were the royal arms of France. The same year, the Ohio Company was formed by a number of wealthy Virginians, and it was their plan to settle a fourteenth colony along the Ohio River. Lawrence Washington, the elder brother of George, was one of the managers, and in 1750 much of the land in what is now western Pennsylvania and West Virginia was surveyed.

The French began to build forts in the region. The place where Pittsburgh now stands seemed important to both parties, and a few English settled in the neighborhood, but did not build a strong fort, as it was claimed by both Pennsylvania and Virginia, and neither colony wished to spend money on a fort which might be given to the other. When Governor Dinwiddie, of Virginia, heard of these new French forts, he sent a messenger to warn the Frenchmen that they must leave Virginia territory. This messenger was George Washington, and on page 1040 of our book you may read of his terrible journey through the forest.

A NEW AND IMPORTANT FIGURE APPEARS IN AMERICA

The commanders of the French forts were very polite, but they said they could not think of leaving without orders from the government of New France in Montreal, and then almost immediately the French began to build a strong fort on the place where Pittsburgh now stands, and called it Fort Duquesne. Governor Dinwiddie sent some Virginia troops to drive away the French in 1754. The commander became sick, and George Washington, the second in command, took charge. Roads had to be cut

through the woods in order to get the cannon and the wagons along, and sometimes the little army did not advance more than a mile or two in a day.

When they had crossed the mountains and had reached a place called Great Meadows, they met a small French force, ten of whom were killed and twenty-two were captured. While waiting for other troops to come to his assistance Washington built a rude fort which he called Fort Necessity. The troops came, and Washington's force now amounted to 300 whites and 150 Indians, who were under a chief called Half-King. There were now about 1,400 French at Fort Duquesne, and 600 of them marched to find Washington. The Virginia forces had very little powder, and after it was gone they surrendered, but were allowed to march away. Half-King did not think very highly of such war and said that the French acted like cowards and the English like fools.

War had not yet been declared, but both nations at once sent troops to America. General Edward Braddock with about a thousand English regular troops reached Virginia early in 1755. The plan was made to attack the French in four places at once. They were at Fort Duquesne, on Lake Ontario, on Lake Champlain and on the border of Acadia, which was at this time a British possession. General Braddock was to take Fort Duquesne.

A BOASTFUL ENGLISHMAN COMES TO GRIEF

Besides his British troops, nearly 500 Virginians were with Braddock when he started on the march, but he did not care much for these nor for the help of the Indians. He knew nothing about fighting in the woods, and thought that his trained troops were worth more than any others. When Benjamin Franklin tried to warn him of the dangers he would meet, he answered that the Indians might make trouble for the raw militia, but that they could make no impression on the king's regulars. Some of the colonists grew angry and left.

His army at last came close to Fort Duquesne. He was met, July 9, 1755, by a party of Canadians and Indians under Captain Beaujeu. The British fought bravely, but they could not see anybody to shoot at, for the Canadians and the Indians fought from behind trees, while the

WASHINGTON'S TRIP AND BRADDOCK'S DEATH



When the French began to build forts on the Ohio River, a young surveyor named Washington was sent by the governor of Virginia to order them away. With a few companions he reached the forts.



General Braddock, who led an army into the wilderness to attack the French, did not understand how to fight the Indians, who fought from behind trees and would not come out to be shot at. Only the Virginia troops, who were used to such fighting and adopted the same plan, prevented all from being killed. General Braddock died from his wounds, regretting he had not been wise enough to take advice.

British stood in the narrow road. It is not true that Braddock was surprised, for he knew that he was coming to a dangerous place, but he did not know how to meet the enemy and he was too obstinate and too stupid to learn. The bright red coats of his army made good marks. Braddock himself was everywhere, encouraging or scolding his men, but it was of no use. The Virginians fought from behind trees and logs and kept the enemy from killing everyone, but Braddock would not allow his soldiers to protect themselves at all. They stood just as if on parade, but they could do little damage to the enemy. At last Braddock received a wound from which he died in a few hours, and George Washington led away what was left of the little army. Nearly two-thirds of the army had been killed or wounded.

THE FOUNDATION FOR THE STORY OF EVANGELINE

This same year the French inhabitants of Acadia were sent away from their homes. The poet Longfellow, in *Evangeline*, has told the story, but all that he tells is not quite true. All of the Acadians were not so good as he says, and the English were not so cruel. The Acadians did not like to have their country belong to England, and many of them plotted with the French and the Indians. The English found that they could not keep Acadia unless something was done, and decided to send the Acadians to the different English colonies where they could not do so much harm. Most of the families were kept together, but some were separated in the rush and the hurry, and it is of one of these cases that the poet writes.

THE FRENCH AND INDIAN WAR BEGINS AT LAST

All these battles had been fought while England and France were supposed to be at peace, but in 1756 war was declared and began in earnest. It was called the Seven Years' War in Europe, but in America was called the French and Indian War. Battles were fought not only in Europe but in Asia and in America. The French sent a good general to Canada, the Marquis de Montcalm, who soon began to win victories for France, but he could not control his Indians. When they helped to capture a fort or an army, they thought they had the right to kill all they captured. When Fort William

Henry on Lake George was taken, Montcalm promised that the English force should go home unharmed, and the Indian chiefs agreed, but after they started, the Indians killed all the wounded and kept making attacks on the column until they had killed six or seven hundred. At another time, Israel Putnam, whom we shall meet again in the Revolution, was captured, fastened to a stake, and the flames were already curling about him when he was set free by a French officer who was not afraid of the Indians.

THE FRENCH ARE SUCCESSFUL AT FIRST

We cannot tell of all the battles and massacres which took place in the next few years. In nearly all of them the French won, and many English and many Americans were killed and scalped. But Montcalm was not supported as he should have been by his government, and the tide began to turn. William Pitt was now in charge of the war in England, and he was determined to drive the French from North America. He was not willing, as other English statesmen had been, to take a little bit of territory here and another there, but he intended to take it all. So many soldiers were sent out that the American colonists were encouraged to raise both money and men for the war.

In 1758, Louisbourg, on Cape Breton Island, was again taken, though the French thought it too strong to fall. In this capture we see, for the first time in America, the soldier who was finally to end the war, General James Wolfe. Though Sir Jeffrey Amherst and Admiral Boscawen were in chief command, the credit of taking this fort must go to Wolfe, for it was he who forced the French to abandon the Grand Battery and finally to surrender. With the surrender of Louisbourg, the St. Lawrence was open for the entrance of the English fleet, and all eyes next turned to Quebec, as the prize for which the English must fight the next summer.

THE INDIANS BEGIN TO DESPISE THE ENGLISH

Victories were necessary if the English were to remain in the country. The Iroquois hated the French, as you have been told before, but they were beginning to despise the English, who could not overcome the enemy of both. If the French continued to win victories, soon the Six Nations would refuse to help the

English longer, for the Indians never liked to be on the losing side, and the help of the Six Nations was valuable in many ways. They had seen the English and Americans lose Fort Oswego and Fort William Henry and fail to capture Ticonderoga. Indians came to visit Montcalm, saying that they wished to see the man who trampled the English under his feet.

THE TIDE TURNS AND THE ENGLISH WIN VICTORIES

After Louisbourg the tide turned, and English victories came rapidly. Fort Frontenac, built of stone by La Salle, where Lake Ontario flows into the St. Lawrence, was taken and battered down by its own cannon. An immense stock of war material was taken across the lake or destroyed. The Six Nations decided that perhaps the English might win after all, and they became sure of it a few months later when Fort Duquesne also fell into English and American hands. The little settlement around the fort was named Pittsburgh, and the next year Fort Pitt was built. From that small beginning the great city of to-day has grown.

THE GENERAL WHO TOOK QUEBEC AT THE COST OF HIS LIFE

With the beginning of fighting in 1759, more important English successes came. Fort Niagara, at the mouth of Niagara River, fell, and shortly afterward Fort Ticonderoga was given up by the French. As rats desert a sinking ship, the Indians grew less willing to help the French, while on the other hand the Six Nations forgot that they had even thought of ceasing to aid the English. You remember that the Five Nations became the Six Nations when they were joined by the Tuscaroras.

Quebec, however, still remained in French hands. Built high on a cliff, over two hundred feet above the St. Lawrence River at the point where the St. Charles River empties its waters into the greater river, the French boasted that it could not be taken. General Wolfe had gone back to England to try to recover his health. There he found that the government was depending upon him to take the fortress. Though far from well, he returned to America. He came up the river in June, 1759, and during the whole month of July sat before the city trying to find a way to take it. Sickness seized his body in August, but his mind was

always on his task. He felt that he could not live long and begged the doctor to "patch him up enough for this business."

Attack in front was impossible, and below the city there was no hope of success. Wolfe then rowed up the river, and his keen eyes finally spied a path along the side of the cliff, used perhaps by goats, or by reckless young men who wished to get quickly down to the water's edge. Few thought of climbing up the cliff. Moving his ships up and down the river without any reason that could be seen, he puzzled General Montcalm, who could not imagine what the British were trying to do. On the night of the 12th of September, a part of his men pretended to make a landing below the city, and Montcalm himself spent the night on horseback.

All seemed quiet farther up the river above the city, but at midnight 1,600 men in small boats stole down the stream in the shadow of the cliffs. Wolfe in his boat was repeating verses from Gray's "Elegy in a Country Churchyard," and said to one of his friends, "I would rather be the author of that poem than take Quebec."

THE FRENCH ARE SURPRISED AND BEATEN

Quietly the soldiers landed and began the steep climb up the cliff, which they gained before the sentinels knew of their presence. Before six o'clock, the 1,600 were drawn up on the broad field at the top of the cliffs, called the Plains of Abraham. Three thousand more soon followed. Montcalm marched out of the city to meet the English as soon as he could, and a fierce battle followed.

On this broad plain the English had the advantage just as the French had it in the woods at Fort Duquesne. Wolfe's soldiers were English regulars who were used to fighting in open spaces where they could see their comrades and hear the orders of their officers. A large part of Montcalm's force was made up of Canadians, who were splendid fighters in the woods, where they used Indian methods, but did not do so well in the open ground.

Wolfe was wounded in the wrist but tied a handkerchief around his arm and kept on. A ball struck his leg, but still he did not stop. A third bullet passed through his lungs. He fell and was carried to the rear, as you can see in one

of our pictures. As he lay there apparently dead, he heard an officer say, "See how they run!" The dying man tried to raise himself, saying, "Who run?" When told that the French were giving way everywhere, he sank back whispering, "God be praised, I die in peace."

THE BRAVE FRENCH COMMANDER DIES DEFEATED

The brave French commander met the same fate. He was struck in the chest, but at first seemed not to feel the wound, until all at once he fell from his horse. When told that he was dying his answer was, "So much the better. I shall not live to see Quebec surrendered." He lingered a few hours, but died the night of the battle. A few days later the city opened its gates to the English. Now upon the Plains of Abraham stands a tall monument erected in honor of two brave men who died, one at the moment of victory and the other in the bitterness of defeat.

The next year an unsuccessful attempt to retake Quebec was made. Soon Montreal also fell into the hands of the English. The colony of New France was conquered, and English officers ruled. The war continued in Europe, however, and in 1762 Spain joined in to help France. The English fleet was too strong for the allies, and Cuba and the Philippine Islands were taken from Spain. Peace was made the next year (February 10, 1763), and the map of North America was made over by the famous Treaty of Paris.

THE NEW MAP OF NORTH AMERICA AFTER 1763

England took all New France and all the eastern half of the Mississippi Valley from France, but gave back Cuba and the Philippines to Spain. In return for these islands, however, she took the Floridas from Spain. East Florida was almost the same then as the present state, and West Florida was a strip of land along the Gulf of Mexico and reaching to the Mississippi River. Since Spain had lost some of her valuable possessions because she had come to the aid of France, that country gave to her the city of New Orleans on the east bank of the Mississippi, and all the territory claimed by France west of that river extending to the Rocky Mountains on the west, and to the head of the Missouri River on the north. We shall meet with

this territory again under the name of Louisiana, though what we now know as Louisiana is only a small part of the territory of Louisiana.

This left France without a mile of territory on the mainland of North America. Only two powers remained. England controlled the eastern half of the present United States and eastern Canada, and claimed a great unexplored territory west of Hudson's Bay. Spain controlled Central America, Mexico and most of what is now the United States west of the Mississippi River, as well as the mouth of that stream.

Two tiny islands, or groups of islands, St. Pierre and Miquelon, off the coast of Newfoundland, were left to France. They are barren and rocky, and have little value except to serve as harbors for the fishing fleet from France. They remain French possessions to this day. Some of the French islands in the West Indies, which had been captured by the British during the war, were, however, returned by the treaty. France still governs some of the West Indies.

ENGLAND'S VICTORY BRINGS TROUBLES WITH IT

The struggle for the continent was over in Europe for the present, and the great question for England to settle was what to do with her possessions. The war had cost many men and much money, and the Indians were not friendly. Soon the Indians who had been friendly to the French rose to make a last effort to drive the English from what had been French territory. Under the chieftain Pontiac they fought desperately and inflicted much damage. The English fought stubbornly and at last the "Conspiracy of Pontiac" was broken.

It seemed that it would be necessary to keep an army in America to watch the Indians. The colonies had cost much more than had been received from them, and they seemed likely to be a cause of expense for many years. Could they be made to pay a part of the cost of protecting themselves from the Indians?

The British government thought it just that the colonies should pay something, and Parliament soon began to levy taxes without asking the consent of the colonists. The result will be told in our next chapter of the History of the United States, which will tell of the Revolution.

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 965.

The Book of Familiar Things



A busy scene at a South Wales pit-head.

COAL AND WHAT IT CAN DO

COAL is a wonderful thing, and the wealth and prosperity of many countries have been built up on its use. We burn it to keep ourselves warm during the winter, and we cook our food with it, or with gas made from coal. We burn it under great boilers to change water into steam to keep our engines moving, and thus we run our factories. We move railway trains and ships with it. We change it into electricity, the wizard servant of mankind. We obtain from it lovely colors, delicate perfumes, invaluable medicines, powerful explosives, fertilizing manures, and a host of useful things. So wonderful is coal, and so numerous its uses, that were we to tell all that could be told about it, the things it can do, and the things that can be made from it, we could fill every page of our book.

Although coal is so important, it has been much used only in what we may call recent times. Wood was easier to get, and we did not know what a treasure was hidden in the earth. All that was realized was that here and there on the surface a black stuff was found which could be burned as fuel. The Greeks are thought to have used some coal over two thousand



years ago. The Romans, during their four hundred years in Britain, used a little coal, and the tools they used are still being discovered. The famous Marco Polo, the Venetian traveler who made his first journey to China in 1271, mentions in his book, as one of the curiosities of Chinese life, that he found a sort of black

stone used as fuel. It was strange to him, for Italy has so little coal that she is, for practical purposes, coal-less.

We are all more or less familiar with coal, although few of us, except miners, have ever seen the deep places from which coal comes. We know it as a black, heavy, bulky, shiny substance, the dust of which quickly blackens those who handle it. We know that ordinary household coal burns readily, giving an intense heat. But let us see how coal was formed, and where it comes from.

Coal is the fossilized remains of vegetation which flourished on the earth long before the time of man, in far-back Carboniferous times, as we call it, because then the great "coal trees" grew. Coal is always formed in layers, or seams, and these seams sometimes rest on beds of clay, which the miner calls the underclay. The

fossilized roots of the ancient vegetation which has been changed into coal are often found penetrating the underclay, showing that it was the bed of soil upon which trees and plants once flourished. The time that must have gone to the making of coal-fields is beyond all our imagining. Try to think of vegetation flourishing for long periods and then being buried as the surface of the land was lowered. Water rushed in, and new soil was formed at the bottom. After this had continued for a long time, so that the layer of decayed vegetation had become deeply buried, some fresh movement of the earth raised the bed. Plants grew again and formed a fresh layer of vegetation. The land again sank and the vegetation was buried.

THE POWER THAT LIES HIDDEN TWO MILES DEEP

This occurred again and again, for we find seams of coal separated from each other by layers of clay, or shale, or sandstone or limestone.



Such processes have gone on for such a length of time that

these layers of coal exist as deep as twelve thousand feet, or over two miles down from the surface. Take a walk of two miles, and then try to imagine coal as far down in the ground as you have walked. Then imagine, if you can, that ages and ages ago this deep-down coal was on the surface of the earth. Some of the coal in South Wales is almost as deep below the surface as the top of Mont Blanc is above it.

It has been calculated that it would require at least a thousand years to make a bed of coal a foot thick. The rock between also took a long time to form. A great authority, Professor Edward Hull, once pointed out that the laying-down of the South Wales coal-fields must have

needed 640,000 years. If that period of time seems beyond the power of thought to conceive, what of the greater depths below? In the Derbyshire coal-fields, beneath the coal we find limestone perhaps five thousand feet thick. This limestone is full of sea fossils, so that it must have been deposited at the bottom of what was once the sea.

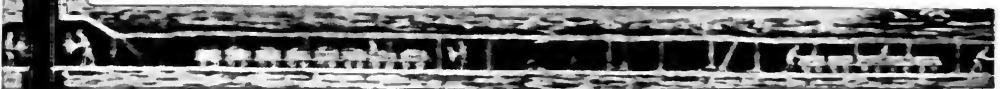
MINERALS THAT HAVE MADE GREAT BRITAIN A GREAT WORKSHOP

There are good reasons why Great Britain became an important manufacturing country so early. It has splendid coal-fields near the sea, but the Carboniferous rocks also contain an abundance of iron ore and limestone. Thus placed close together were the three materials—coal, iron ore and limestone—needed to make iron: iron ore to smelt; coal for fuel to melt it; limestone for mixing. This wonderful combination of materials, as soon as the use of coal was developed, placed Britain for many years at the head of the world in iron. They made her a great manufacturing nation, and established the islands as a great workshop.

It is strange to think that we handle in our homes the blackened remains of giant trees from forests buried thousands of years ago, after they had flourished for centuries. Grim and silent were those ancient forests. No man sheltered beneath their branches, for there were no men on earth. But to-day we use the store of carbon from those trees to maintain our lives. The forests which flourished before Man came had disappeared when Man appeared; but still Man draws from them the power to dominate the world he lives in. The sunlight which beat down on these age-old forests was imprisoned in the coal we live on, and we know how to make it shine and burn again in our own time.

THE CLEAN ANTHRACITE COAL THAT IS NEARLY ALL CARBON

There are many varieties of coal. Peat represents the first step in forming coal, but it is not coal. It is believed that the different coals have been made from peat by differing amounts of heat and pressure. Some coal is brown and not highly car-



This is a picture of a coal-mine, showing how the coal is dug out of the earth, how it is drawn in small cars to the bottom of the shaft and how it comes up to the top, where it is prepared for market.

THE FORESTS FROM WHICH COAL WAS MADE



The forests that no man saw—from these great fern trees, drinking in the sunshine of millions of years ago, came the coal which drives the engines of to-day.

bonized, being really half-made coal, or lignite—named from the Latin word for wood, *lignum*. A great deal of lignite is found on the continent of Europe. Germany is rich in it. Canada has many millions of tons of it. There are some lignites which are very wooden, and others which have almost become bituminous coal. The black substance called jet, sometimes used for ornaments, is actually a variety of lignite.

At the other end of the scale is anthracite, the coal most fully carbonized. It contains from 90 to 95 per cent of carbon. It is hard and shiny, and does not soil the fingers. It is difficult to light, and will not burn easily in an open grate. But when lighted and burned in a furnace, with a proper draft, it gives out an intense heat with little smoke or flame. Pennsylvania produces most of the anthracite used, though Wales and Canada produce some.

Ordinary black coal is called bituminous coal, and contains about 85 or 90 per cent of carbon. Its chief varieties are coking (or caking) coal, which swells up into a mass of coke when heated, and non-coking coal, which does not form into coke when heated, and is used for burning in domestic grates or for making steam.

Coal-fields vary greatly in their nature, and serve different purposes and different interests according to the nature of the coal they produce. We need not be surprised at these variations when we consider the strange way in which coal was formed. If we did not know that there were many varieties of coal, we should expect it to be so, because of the different circumstances in which coal beds were formed, buried, and put under enormous pressure. Every sort of coal, from brown lignite to hard anthracite, can be put to good use.

COAL AS A MAGNET WHICH DRAWS OTHER INDUSTRIES TO IT

The countries which have coal in great quantity are fortunate, for coal is still the main fuel known to man. If the whole of England were covered with trees, all of them would have to be cut down in a year to yield the power which a single year of the coal supply gives. Oil is a splendid fuel, but there does not seem to be enough of it in the world to take the place of coal.

It is a great thing for a country to

have coal, because it is so heavy and bulky that it is costly to transport. Therefore, factories often spring up near coal-fields to save cost in carrying coal. It is often cheaper to carry raw materials to coal than to carry coal to raw materials. Thus coal acts like a magnet in drawing industries to it.

THE INDUSTRIAL NATIONS AND THE KEY TO PROSPERITY

That is how England, Scotland and Wales, each having good coal, became manufacturing districts. Ireland, being almost coal-less (she has some deposits, but they are not large) has remained an agricultural nation. Even as to England, we may notice how the chief industries are carried on in the North Country and the Midlands, because there the coal is found. Counties like Norfolk and Suffolk, which are not near coal, do little manufacturing.

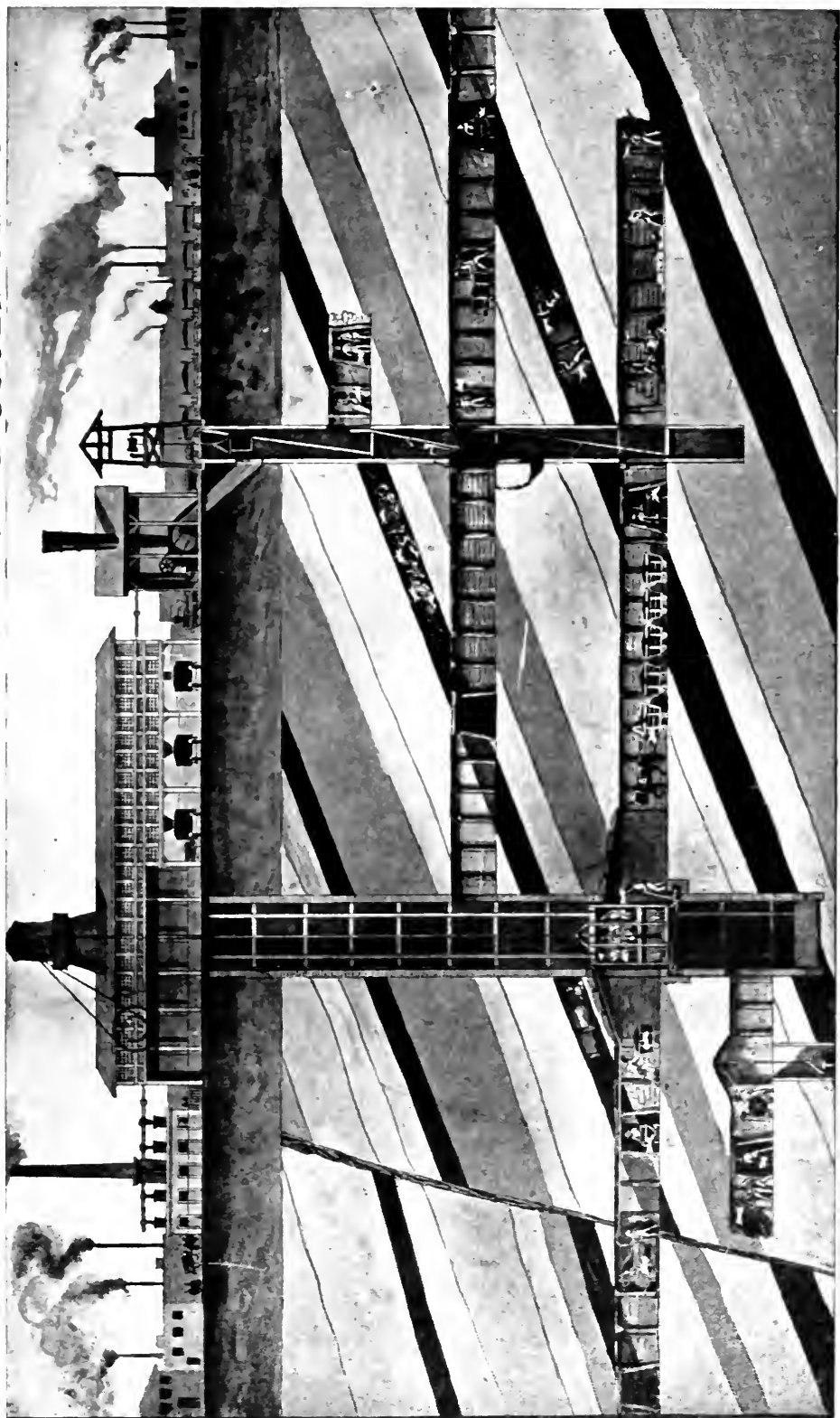
The chief white nations that have coal are the United States, Great Britain and Germany. Between them these three countries produce about four out of every five tons of coal produced by all the world. That is a very striking thing, and it helps to account for the industrial position of these three countries. Having plenty of coal, and producing more of it than all the rest of the world put together, they do more manufacturing than all the rest of the world.

We may easily misunderstand this, and attribute to some special skill what is really the good fortune of these three nations. If the United States, Great Britain and Germany were suddenly to lose their coal, we should soon find what an enormous difference it would make. Their power to work would largely disappear, and their great populations would become poor. They would become like Spain and Italy, unable to manufacture on a great scale.

HOW THE WORLD WAR AFFECTED THE WORLD PRODUCTION OF COAL

In war, as in peace, coal has much to do with victory or defeat. It was the coal of Great Britain and the United States that enabled the Allies to triumph in the World War. France, with comparatively little coal, and Italy, with an insignificant trifle, could not have continued to fight if ships had not carried to them enormous quantities of coal to run their trains and make their munitions. Under the Treaty of Versailles much Ger-

WHAT A MINE WOULD LOOK LIKE IF WE COULD SEE IT



We get an excellent idea of a coal mine from this picture. The thick black lines are coal seams, and roadways lead to these from the shafts.

man coal was made over to France, so that Germany is not such a rich coal country to-day as she was before the war.

The United States produces about two-fifths of all the coal mined in the world. This is a wonderful fact, and when we realize it we understand why the United States is so rich and powerful. She is the greatest coal country, and as she is also the greatest oil country, the greatest cotton country, the greatest iron country, and the greatest lead country, she is indeed a favored nation. A century ago she had a very small population indeed, but when modern inventions showed how to use natural resources the United States made even more rapid progress than Great Britain did, because her natural resources were so much greater.

OTHER COUNTRIES HAVE LARGE SUPPLIES OF COAL

Though the United States, Great Britain and Germany produce the greater part of the coal used in the world, many other countries have considerable supplies.

Canada has a great deal, though she buys nearly half she uses from the United States. This is because the principal coal beds are either in the Maritime Provinces or else in the West. Quebec, Ontario and part of Manitoba are nearer to the coal-fields of the United States, and it is cheaper to buy in the United States than to pay the freight on Canadian coal. Probably we shall soon see Canadian factories growing up near the coal-fields.

Nearly all the European countries have more or less. Russia has a great deal, though no one knows exactly how much, as the fields have not been thoroughly explored. There is also coal in South America, but here, too, the fields have not been explored. Coal has also been found under the ice of the great Antarctic land around the South Pole.

Africa seems to have but little coal, though there are some rich mines in the southern part. Australia has valuable coal-fields, and so has New Zealand. Asia has a great deal, but we cannot say how much. India, Siberia and Japan all have coal.

In China, where coal was used for fuel long before Europeans began to burn it, there are enormous coal deposits, but her people never practiced modern coal-mining or learned how to utilize steam power. In recent years Europeans have begun to work Chinese coal, however, and it is possible that in the time to come great

modern industries may be built up on the splendid fuel resources of China.

THE WONDERFUL STEAM PUMP THAT CLEARED THE MINES OF WATER

The next most remarkable thing to notice about coal is that it was a great inspiration of modern inventions. Let us see how that was. Coal at first presented a great problem. A certain amount appeared on the surface—outcropped, as the miners say. That coal could be easily dug and used. As soon as this coal was exhausted, however, serious coal-mining had to be done. But how was it to be done?

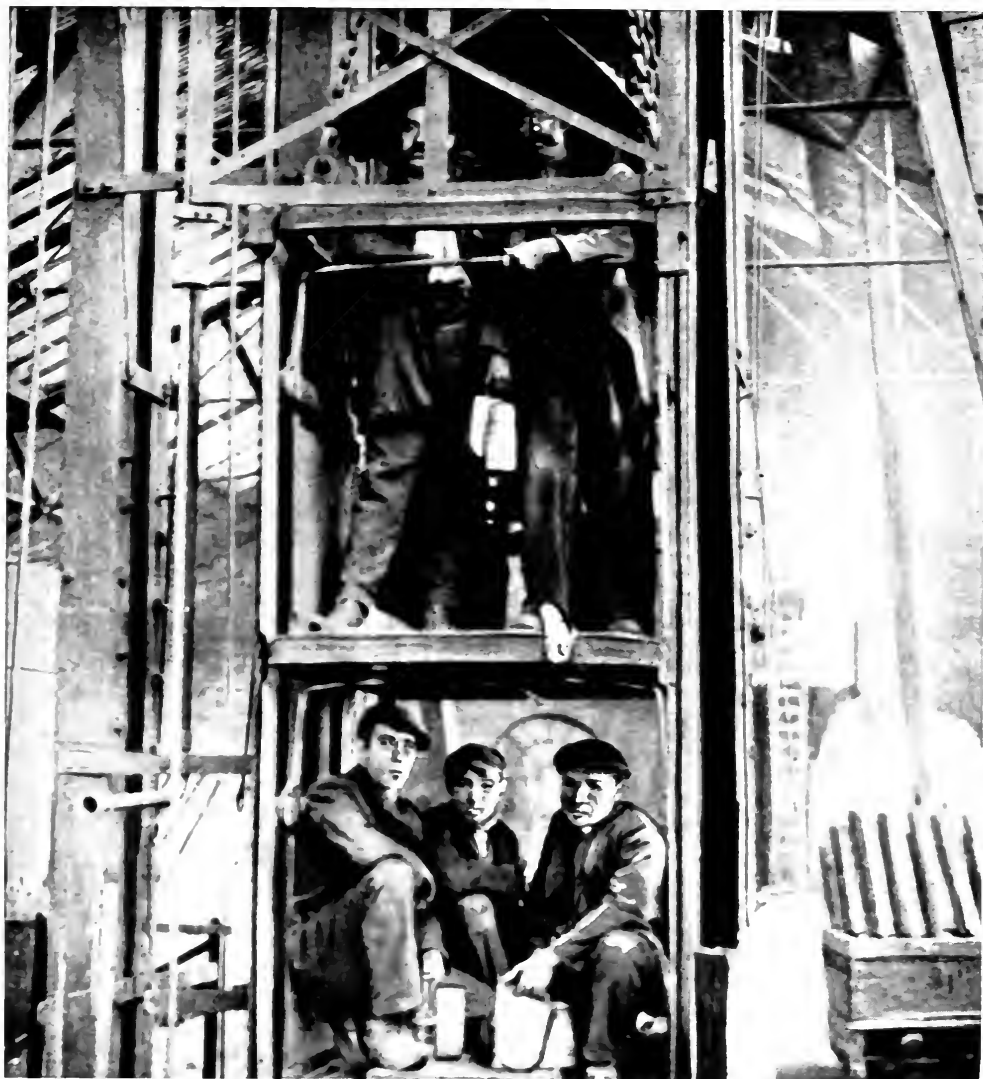
That was the problem which had to be solved. Wherever coal was deeply dug, water accumulated in the hole and no more coal could be got until the water was pumped out. So the miner was compelled to devise means to pump water on a big scale. The necessity to do this led to the invention of the steam engine. Never was more clearly illustrated the well-known saying "Necessity is the Mother of Invention."

THE FAR-REACHING EFFECTS OF MAN'S DEMAND FOR COAL

Deep coal-mining now became possible, and so coal became available in big quantities. But we see that it was the great need to get coal which stimulated men's minds to invent engines. So it was with the railway itself. It was the need to carry coal which first led colliery men to lay down rails to help to move coal trucks; so that coal-mining led to the making of the first railway. Colliery engineers next began to think how the steam engine which had been so greatly improved by James Watt could be utilized to help to carry coal on rails. Chief among these thoughtful and inventive men were Richard Trevithick, who was born in 1771, and George Stephenson, who was born in 1781. They gave us the steam locomotive which came into existence to help to carry coal, just as the rails themselves had come into existence.

These inventions, combined with the fact that in 1750 Abraham Darby discovered how to smelt iron with coal instead of with wood, gave the world ample supplies of metal for making machines. It is a curious thought that it was not until coal gave us plenty of iron that it was worth while to invent machines. Suppose that in 1700 there had been born a great genius who drew on papers plans of the

GOING DOWN INTO AN ENGLISH MINE



When the miners arrive at the pithead for the day's work they enter a cage which sometimes has two or more stories, and are lowered to the bottom of the shaft, from which they go to their work.



For the rest of the day the men remain below the ground, taking their meals in the workings, often at a place a mile or two from the shaft by which they entered. Here we see two miners at their lunch.

tens of thousands of clever machines which we know to-day. His work would have been of little use in his time, because there was not enough iron to make large numbers of machines. Perhaps we now begin to understand how coal has made the modern world and changed the face of civilization. Our age may truly be called the Coal Age, and the greatest nations of the world are those with plenty of coal.

THE MILLIONS OF TONS OF COAL THAT STILL REMAIN

Very naturally, therefore, we ask: How long will the Coal Age last? If coal is so invaluable to the work of the world, what will happen when coal becomes exhausted? In some parts of England we may visit places where, because a coal-mine has become exhausted, the place has fallen into decay and the population departed. It seems clear that if coal should be exhausted to-morrow, the whole nation would fall into decay, and millions would either starve or be driven to seek work in other lands.

Fortunately, there is an enormous amount of coal in the earth. This is probably enough to last for several centuries, allowing for reasonable increase of output. Unfortunately, as the years pass, coal becomes more difficult to get, because we have to go deeper down for it, and much of the coal in the ground would be very difficult indeed to reach. As time goes on, therefore, coal is likely to become dearer, which means, of course, that goods made by burning coal would also be dearer.

THE CHANGES THAT WILL COME WITH THE END OF THE COAL AGE

But it is quite possible that long before our coal measures are exhausted, science will have invented some better method of producing energy for driving engines and doing mechanical work. In that case coal will become a curiosity exhibited in museums for the astonishment of a future generation, who will smile to think that their forefathers had to burn such dirty stuff to run their factories and warm their houses in winter. When that day comes, the Coal Age will have gone, and very curious changes will take place between nations.

As things are, it is the nations that have the most coal that triumph in wealth and power, but if science should show us how to get energy without coal, the big

coal nations would be no better off than the others. The United States, Great Britain and Germany would no longer have their special advantages in trade and industry. It certainly would be a much better world as a whole if every nation had its share of some universal supply of energy.

THE HIDDEN DANGERS THAT LURK IN THE PITS

Coal-mining is, of course, an arduous and dangerous employment. Coal gives off gases which the miner has good cause to learn to dread. There is carbon dioxide, which the miner calls choke-damp, suffocating all who breathe it. There is the gas called methane, which the miner calls fire-damp. Fire-damp, mixed with air, becomes explosive, so that the miner does not dare to carry a naked light.

Yet mining explosions, terrible as they are, are not the only danger of the mine. It is the small accidents, day by day, which do the greatest injury in a year. Sometimes the roof falls in. Sometimes the cages that carry the men, the coal, the tools and the materials up and down the pit-shafts, go wrong. Sometimes there are accidents on the small railways that carry the coal underground. In these and other ways, and in explosions, thousands of coal-miners are killed every year, while tens of thousands are injured more or less severely. All over the world, in the better mines, greater and greater care is being used to protect the millions of miners underground.

We have seen that there are many sorts of coal in the world, and that, of course, means that there are many sorts of mines. In the United States there is plenty of shallow coal left, which is easily got out. In Great Britain most of the mines are fairly deep, and so it is in Germany, Belgium, and many other places. In England in some places the mines are over three thousand feet deep, and in a mine as deep as that it is very hot, so that the miners must work nearly naked, and they also get very fatigued.

THE CAGES WHICH TAKE THE MINERS DOWN TO THEIR WORK

Some coal-mines are made by boring a shaft, sometimes round and sometimes square, about twenty feet wide, down to the coal. From the bottom of the shaft many galleries open out like underground streets. Great elevators run up and down the shaft; they are called cages.

WHAT A MINE IS LIKE UNDERGROUND



One of the dangers of mining is the deadly fire-damp, and here we see a miner testing for the gas.



As the coal is dug out of the earth the roof of the mine must be supported by wooden props.



The miner works in all positions. Sometimes he lies on the ground, and at times stands on a ladder.

Instead of moving slowly, however, they move very quickly, so that the first time one goes down in them the suddenness of the descent is quite startling. They seem to drop down like a stone, and if an accident occurs it is sometimes very serious. The reason why the cages are moved so quickly is that all the miners have to be moved up and down through one hole, and it would take a long time to get them to their work unless the cage worked rapidly. For the same reason, the coal has to be lifted quickly. In the United States many mines are reached by tunnels into the side of a mountain or hill.

There are several ways of working coal seams, but they all resolve themselves into cutting out the coal, getting it to the pit-shaft, and sending it up. Sometimes the seam of coal stretches a mile or more away from the pit-shaft. We can understand, too, how the roof of the seam has to be carefully supported as the coal is cut out. Seams vary greatly in thickness. They may be less than two feet, or as thick as twenty or thirty feet. It is very difficult to work thin seams, and not very simple to work thick ones.

THE MINERS WHO TOIL FOR US ALL IN THE DEPTHS OF THE EARTH

The coal-miner does not hack away at the coal in getting it. He cuts under a mass of coal for a few feet, and then breaks down the coal by driving in wedges or by using explosives. This undercutting is trying and dangerous work, for in doing it the miner has to crouch under the cut he has made, and there is danger of his being crushed. Many machines have been invented to do the undercutting, and they are coming more and more into use. We show you some of them. The use of explosives in bringing down coal is very dangerous in fiery mines (as the gassy mines are called), and must always be done with the utmost care.

When the coal is down, it is shoveled into a little car. In a deep mine it is sent along the underground railway to the pit-shaft, and whisked like a shot up to the surface. Where the entrance is a tunnel, the car may run out to the open air. There is probably no industry so difficult to describe in words, or to bring home to the imagination of those who have not seen it. The writer confesses that he found dropping down the pit-shaft of a coal mine the most wonderful and awe-inspir-

ing experience of his life. It is interesting to do this at least once, if you can, to get a proper respect for one of the most heroic and most necessary of all forms of human toil.

THE PRECIOUS PROPERTIES OF COAL, AND HOW THEY ARE WASTED

It is sad to reflect that in the early days of coal-mining, life was wantonly sacrificed. In England women and little boys and girls were sent down to act as beasts of burden in badly ventilated and dangerous mines. There were no rails then running in the coal galleries, and children dragged coal cars by chains fastened round their waists. The story of those early days makes very sad reading. Later, laws were passed which made mines safer, and protected women and children against a wretched fate.

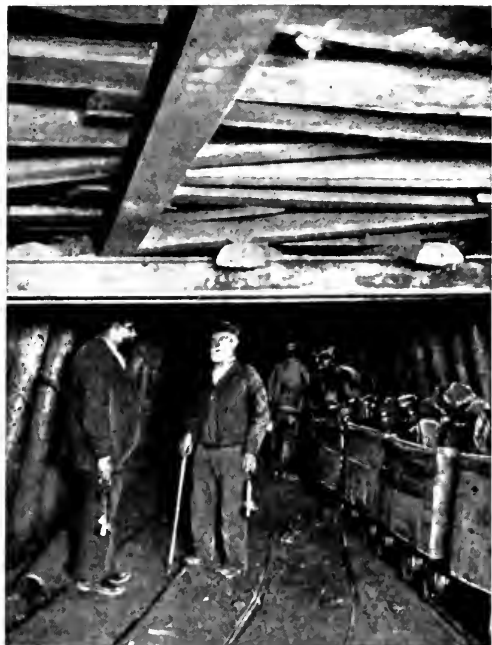
In recent years it has been realized that coal is not only a fuel in itself, but the raw material of solid fuels, gaseous fuels, oils, tar, pitch, ammonia, benzol, and so on. From these products are derived hundreds of substances invaluable to chemists, dyers, photographers and even to doctors. When we burn coal in a grate to make a cheerful room, we waste all these precious things, and the time will come when we shall cease to do so. Coal is the treasure of our land, and we shall one day learn its precious value and cease to squander it as if supplies were inexhaustible.

One day, too, and perhaps before very many years are past, huge electric power stations may economize the national coal consumption to a large extent by supplying power to industrial undertakings hundreds of miles away.

A large part of the price we pay for coal is really the cost of carrying it. It is much easier to carry electricity to the factory than to carry coal. So a few huge electric plants have been built near the mines, where coal is cheap. The coal is transformed into electricity, and a few wires carry it to the factories. It is probable that this practice will become more common in the future. In some sections coal is saved by turning the power of water into electricity. This may be cheaper also, and it saves coal for those purposes for which there is as yet no substitute. So far, cooking and heating by electricity are more expensive. However, this may not always be true.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 925

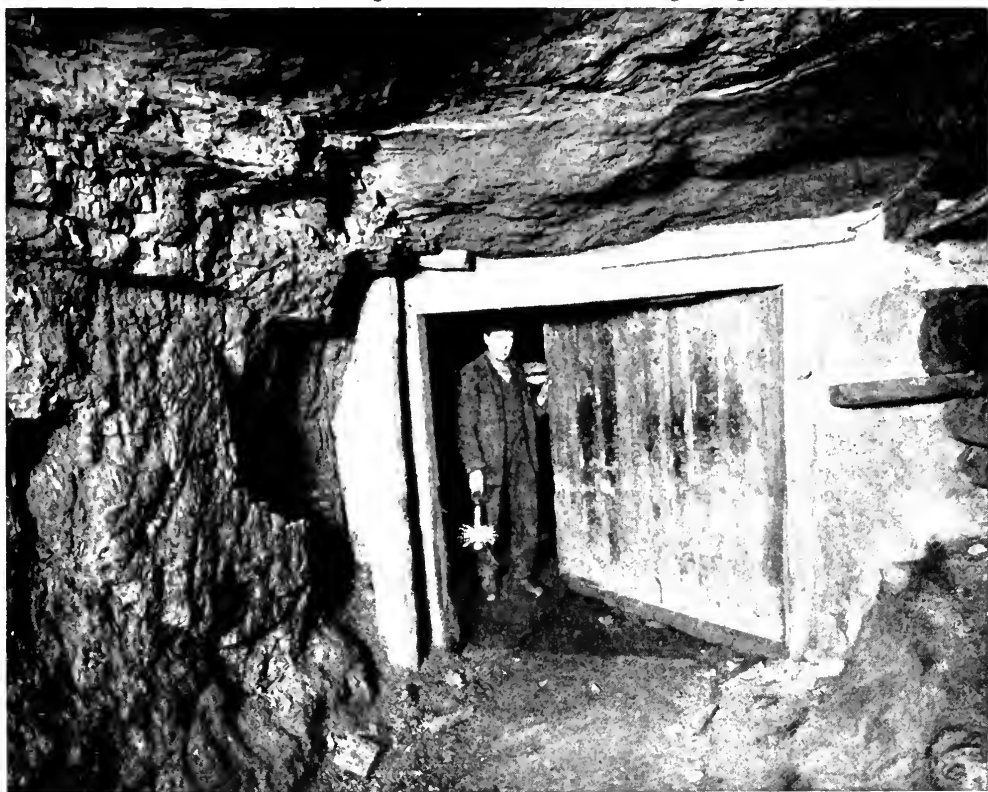
THE WORKINGS PROPPED UP AND MADE SAFE



This picture shows the roof fully supported by props and beams. Without these the roof might fall in.



Here is the timber-man chopping the end off a prop to make it the right length for a gallery.



Doors are placed between the different workings and galleries in order to control ventilation. The man in the photograph is a "fireboss," who is going around to examine the workings and the condition of the mine.

DIFFERENT WAYS OF GETTING COAL

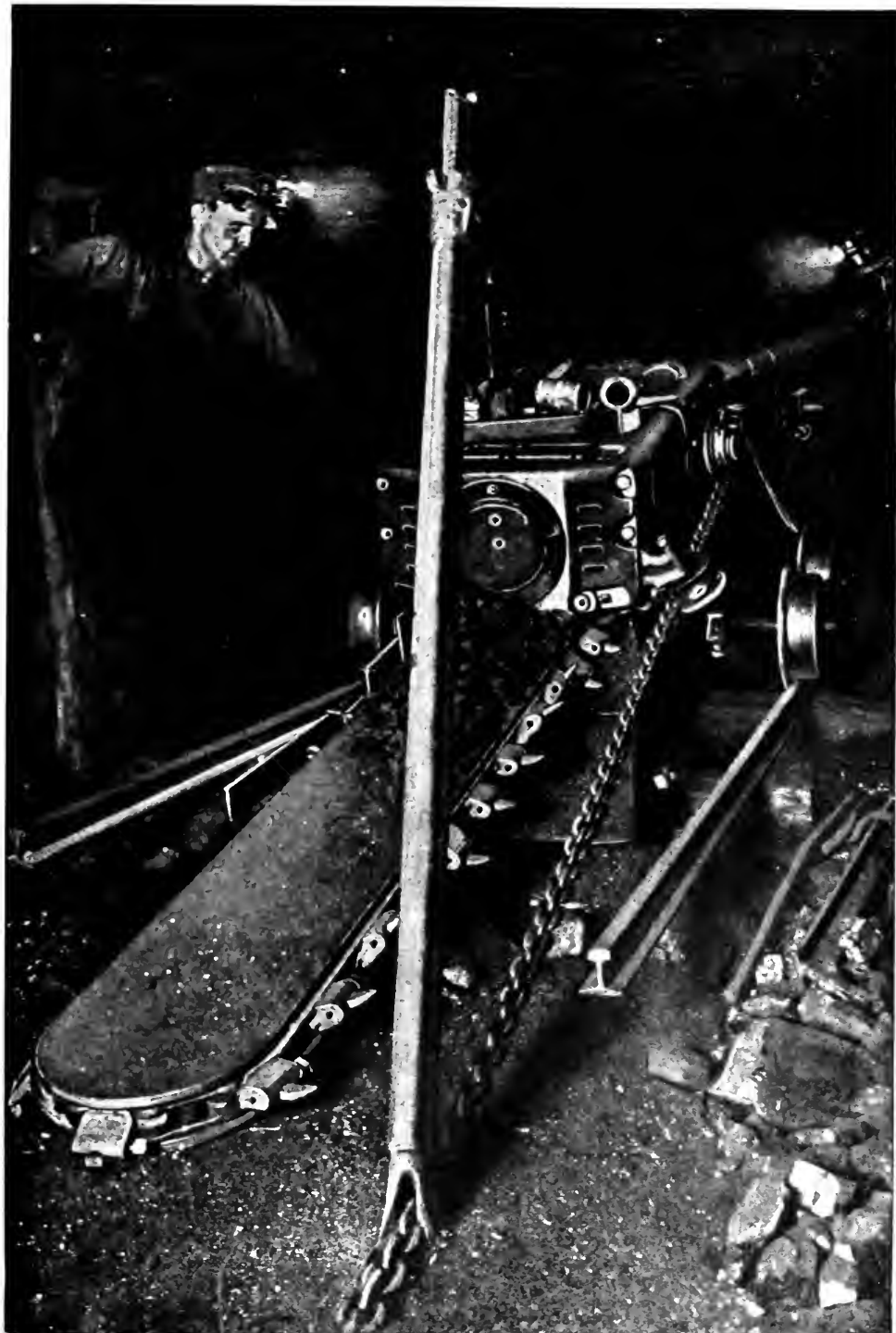


In mines where the seam is thin, miners sometimes work on their sides or backs and loosen the coal with pickaxes. Because of the heat they wear very few clothes. For light they use safety lamps.



Here you see men getting out coal by means of the machine shown in the centre. Where the seam is thick enough it is used to cut a groove under the wall of coal. A few holes are then drilled in the coal, small charges of powder are exploded, and the whole wall is broken down ready to be loaded into cars and taken out of the mine. One of these machines does as much work as dozens of men.

THE MACHINE WHICH CUTS THE COAL



Where the seam of coal is thin, men work as shown on the other page, but this machine makes mining easier. It is run on rails up to a solid wall of coal. The teeth which you see are on an endless chain and go round the projecting arm. The whole wall of coal is undercut, and can easily be broken down.
Photo, Press Illustrating Service, Inc.

COAL ON ITS WAY TO THE FURNACE



As the miners go farther and farther from the entrance, tracks are built after them. When the coal is broken down it is loaded into the cars, which are then run upon scales so that the weight each miner has produced can be known. Miners are paid a fixed sum for every ton they send to the surface.



In the old days cars of coal were drawn by ponies or mules, and thousands of these patient animals are still down in the mines. In the larger and better mines electric engines draw long trains of loaded cars. Here we see one coming out of the mine in the side of a mountain, for not all mines are sunk deep into the earth. Sometimes the entrance is by a sloping way, sometimes by a tunnel.

WHERE THE COAL IS PREPARED FOR MARKET



This is a picture of the immense Diamond Breaker of the Glen Alden Coal Company at Scranton, Pennsylvania. The coal comes from the mines through the long covered way. Inside the building the coal is broken by machinery, and there are many screens with openings of different sizes, which separate the coal into the kinds we know. Slate and other impurities are taken out by machines called jigs, and the coal finally passes down to the cars on the railroad tracks.

NEAR A BITUMINOUS MINE



Loaded trucks from the pit's mouth ascend to the tipple on the left-hand rails, and the empty wagons return by the right-hand track, as seen here. The coal is sifted into various sizes by screens.



The tipple is built over the railway, and as the coal is sorted it is shot into cars waiting to receive it underneath. Then the cars are joined together to form a train, and the coal is taken away.

Photo by H. C. W. S. C.

MOUNTAINS OF COAL STORED BESIDE THE RAILROAD



Very often the market does not demand coal as fast as it is brought to the surface; there is not sufficient room in the cities to store the immense amount needed. Here we see small mountains of coal stored beside the tracks until it is needed. Fortunately coal is not affected by the rain or the snow which may fall upon it.

LOADS OF SUNSHINE FOR OUR HOMES

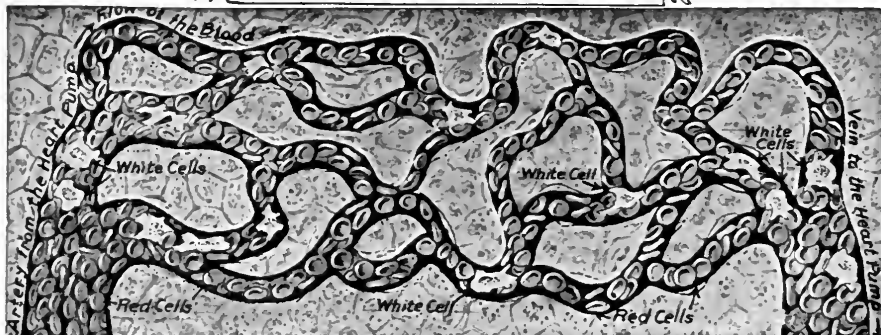


In the slippery city streets horses pulling the heavy coal wagons often fall and break their legs. A motor truck like this can do more work than a dozen horses, and do it more quickly and better.



Our grandparents sat around the fire enjoying the sunshine that was buried in the earth millions of years ago. At the present time, more coal is burned in furnaces, out of sight, and we miss the cheery glow.

The Book of OUR OWN LIFE



Through these threadlike pipes, called capillaries, blood runs to every part of the body, carrying its red cells, which bring oxygen, and its white cells, the wandering chemists that keep microbe burglars away.

THE RED CELLS OF THE BLOOD

WE have been talking about living cells, which are the simple units of all living creatures, as atoms are the units of the elements of matter. We have read of some of the simplest of these living cells, those which are complete creatures in themselves, such as microbes, the ameba found in ponds, and so on.

This prepares us now to study the most wonderful fluid in the world—the red blood which is found in the bodies of all the higher animals and which we know so well in ourselves. Though we think of the blood as a fluid, it is really crammed with living cells, red and white. Upon their health our own health depends.

The gaseous part of the blood is a matter of life and death for us. We breathe in order that its composition shall be kept right, in order that the poisonous gases produced by the body and carried by the blood shall be got rid of; and in order that the life-giving gas, oxygen, shall be supplied to it in proper quantity. All these three parts of the blood—the cells, the fluid and the gases—are absolutely necessary for life. We may begin here with cells, and we may say that, on the whole, cells are of two kinds, known as red cells and white cells.

The red cells are much the more numerous, and are easier to understand. In a volume of blood the size

of about two pin-heads, there should be millions of these red cells. We can

count the number by taking a very small drop of blood, dropping it into a little well made in a glass plate, covering it up

and looking at it through the microscope. We know exactly how deep the well is, and the floor of it is ruled in both directions with tiny lines of which we know the distance apart, so that if we count the number of cells in each of these squares we can reckon the richness of the blood in cells.

This takes a very long time and is very difficult to do, especially as the blood has to be diluted first; but it is very well worth doing, both for the red cells and the white cells, because their number changes very much in different states of health. Very often the doctor knows how to treat a patient because he is able to watch these changes in the number of cells in the blood.

All the color of the blood is due to the red cells. When we look at a single cell by itself, however, it is not really red, but yellow. It is the great number seen together that makes the blood look red.

When you prick your finger, the drop of blood should be of a rich red color, but in people who are living unhealthful lives, or who are not quite well, the blood is often too pale, and

these people suffer in many ways in consequence.

Breathing bad air is one of the chief causes of this paleness. The bad gases in the air are poisons to the red cells and kill many of them, so that their numbers may fall to perhaps much less than half of what they should be. Also the number of cells may be quite up to the mark, but they may not contain the right quantity of the yellow or red stuff which it is their business to carry about.

THE CELLS THAT MAKE OUR BLOOD RED, AND THE WAY THEY WORK

The red cells are round and flat, and thinner toward the middle than toward the edge. When a thing is scooped out in the middle, it is said to be *concave*, and when it is scooped out on both sides, it is said to be *biconcave*; if it is rather flat it is called a *disk*. So we say that red blood-cells are *circular biconcave disks*. Indeed, in shape they are rather like the lenses which shortsighted people have to wear in spectacles.

When the blood is healthy, the red cells are all of the same size and shape. We cannot see any nucleus in them. But each cell had a nucleus when it was younger. When they are grown up, they lose their nucleus; they cannot divide into two, as many cells do, and they live only a short time in the blood—perhaps a few days or weeks. Then they are broken down and disposed of. This is going on all the time, and all the time new red cells are being poured into the blood.

THE PILLARS OF OUR BODY AND THE WONDER THAT WORKS INSIDE

The red cells are made inside our bones. This is one of the astonishing things which many people find it hard to believe; they think of bones as hard, dead things that exist merely for the same reason as the pillars of a building.

But these are living pillars, and the inside of them is filled with stuff called marrow. It is not only alive, but is one of the most alive and most active tissues in the body. The cells in this red bone-marrow, as it is called, have the amazing power of making new red cells. The blood picks them up as it pours through the bones, unless, indeed, the red bone-marrow falls ill, as it sometimes does. There is nothing, perhaps, that upsets the red bone-marrow so certainly as having to breathe impure gases brought to it by

the blood because we have been breathing foul or stagnant air.

As the blood flows in our bodies the red cells are whirled along with it, but they do not move of themselves. They are very passive things, as different as can be from the white cells. They do not change their shape; indeed, they seem to have an elastic covering which prevents them from doing so. They never eat up a microbe or an enemy in the blood. Sometimes we do see microbes in them, but that is because the microbes have killed the cells, not because the cells have eaten the microbes.

What, then, is the use of the red cells which exist in such billions and billions in our blood? The answer is that their use is simply as vehicles, as carriers of the precious coloring matter they contain. This yellow or red matter has a long name, but it is so important that we must try to learn it.

THE IRON THAT MAKES BLOOD RED AND GRASS GREEN

Its name is *hemoglobin*. The first half of this word is simply the Greek for "blood." Hemoglobin is probably the most remarkable chemical compound in the whole world. It is also one of the most complicated. We have already learned that such a compound as water consists of molecules each of which is made of three atoms. It is probable that there are at least a thousand atoms in every molecule of hemoglobin. They are mostly atoms of carbon, hydrogen, nitrogen and oxygen, but one of them—and it is absolutely necessary—is an atom of the metal iron.

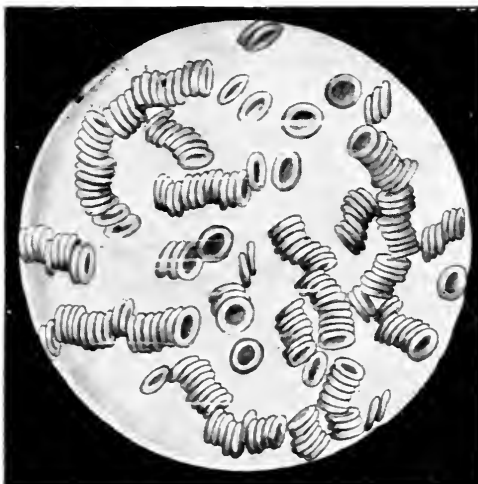
Hemoglobin follows the rule that the compounds of iron are colored. It is interesting to remember that iron is necessary for the most important colored compound in the animal body, and iron is necessary also for the most important colored compound in the vegetable body.

That is to say, iron is one of the things that help to make color in the world—not only the red in our blood, but the green coloring matter of leaves. It may be, then, that very humble forms of life can exist without iron, but at any rate we are certain that iron is necessary for the life of all higher animals and plants. This tells us something about our food, too. The red cells die and are broken up after a time, and their iron is lost.

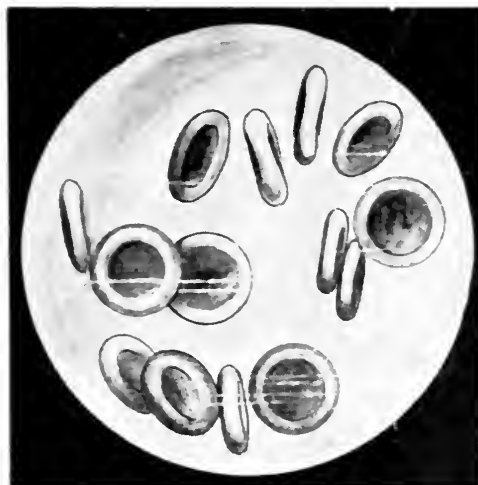
Iron is therefore a necessary part of our food; we should die without it. And perhaps it is interesting to know that the foods which contain iron, and from which we get it, include the best of all our foods, such as milk, eggs, bread, meat, potatoes, peas, rice and oatmeal. The wines which are supposed to be rich in iron, and used to be ordered for this purpose, contain extremely little—nothing like so much as is found in these common foods; and to anyone whose blood is poor in iron milk is worth all the wine in the world.

But we have not yet said why this hemoglobin should be so important. We know that it is important, since our bones are filled with material for making it, and since the blood is crammed with cells to carry it, and since we fall ill at once if the amount of it in our blood falls below the proper quantity.

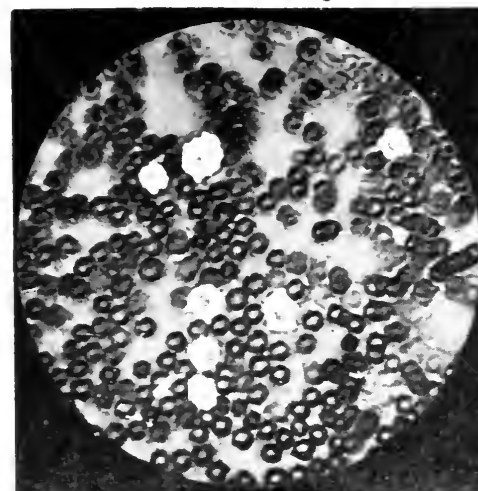
It must have some great use, then, and it certainly has, for it is this hemoglobin that carries the oxygen which we get from the air when we breathe to every part of the body. We have learned that every living cell must breathe or die; every living cell of the body must get oxygen or die. Now the only way in which it can get this



Red cells grouping together as they die.



Red cells floating.



White and red cells of the blood.

A DROP OF BLOOD SEEN IN THE MICROSCOPE

oxygen is through the blood, and the only way in which the blood can supply it is by means of this hemoglobin. Every few minutes—some say every four minutes—every red cell in the blood passes through the lungs, and after doing so it goes to various parts of the body, and so on, again and again, until its life is ended and a younger cell takes its place. The whole meaning of its passing through the lungs is that there it finds oxygen.

Now, the special point to note is this: that the fluid part of the blood, and the white cells of the blood, cannot take up, as they pass through the lungs, anything like sufficient oxygen for the needs of the body. It is only the red cells that can do this, and it is only because of the hemoglobin in them that they can do it.

Sometimes there are plenty of them, but they do not contain enough hemoglobin, and when this is the case, we suffer.

Each molecule of hemoglobin has the power of combining with itself a molecule of oxygen. Now, no one knows the exact composition of hemoglobin, but let us, for convenience, give it a name of its own, Hb. We cannot call it H, because that stands for hydrogen.

Now, a molecule of oxygen will be O_2 . Well, when blood passes through the lungs, all the Hb of the red cells combines with the O_2 in the lungs, and makes a compound which we call HbO_2 . This is simply hemoglobin and oxygen, and the long name for it is oxyhemoglobin. In contrast with this, we sometimes call hemoglobin, when it is not combined with a molecule of oxygen, or when that molecule of oxygen has been taken away from it, *reduced* hemoglobin. We remember that when oxygen is taken from anything, that thing is said to be reduced.

WHAT GOES TO THE LUNGS WHEN WE BREATHE

What comes to the lungs, then, is reduced, or simple, hemoglobin—Hb; what leaves the lungs is HbO_2 . This makes a remarkable difference of color in the blood, for HbO_2 has a bright and cheerful red color—the color of life, as it has been called; while Hb itself has a much darker and more sullen color. We have all probably observed this change in the color of the blood. For example, the difference may be seen at once in anyone who has a choking fit, for his skin becomes dark and purple. All the blood in it is full of Hb instead of HbO_2 because he is not getting air into his lungs. When he gets right again, the healthy color will return, owing to the air's getting into his lungs, and the blood in his skin has plenty of HbO_2 in it instead of having that known as Hb.

If you look at the back of your hand or at the front of your wrist, you will see little blue lines. These are veins, and the blood in them is running up the arm. You can tell that it is doing so, for if you hang your arm down and run your finger firmly along one of these veins, say, on the back of your hand, running your finger downward toward the fingers, the blue line disappears. Then, if you take your finger off, you can see the blood run upward and fill the vein again.

THE CIRCULATION OF THE BLOOD THAT MEANS LIFE

The vein looks bluish because the coloring matter in the red cells of the blood is of the dark kind; it is Hb, not HbO_2 , and this blood is rushing back up your arm as fast as it can in order to get to the lungs, where it will find fresh oxygen which you are breathing in to

get ready for it at this moment; and there the Hb will be made into HbO_2 ; and the dark blood will turn bright again. This bright blood returns to the heart and is pumped by it to every part of the body, where its business is to give up its oxygen, so that the HbO_2 is reduced to Hb again, which is sent back to the lungs for more oxygen, and so on.

The most wonderful thing about hemoglobin, then, is its power of picking up oxygen very easily and of giving it away again very easily wherever it is required. Now we are able to understand the whole duty and purpose of these countless red cells in our blood.

If we are to be well and strong, and useful and happy, we must have a sufficient supply of red cells in our blood, and they must contain sufficient hemoglobin. So we must avoid anything that poisons them, or that poisons the bone-marrow which makes them and so prevents it from supplying them to the blood quickly enough. Bad air is much the most important poison we are at all likely to meet in this country; but in great areas of the world much the most serious poison of the red blood-cells is the tiny living creature which causes the disease malaria. Certain kinds of mosquitoes carry this creature, and when they bite us, pass it into the blood, where it kills many of the red cells.

WHY IS IT THAT MEN DIE IF THEY SWALLOW POISON?

The action of many poisons is due to the fact that they interfere with the work done by hemoglobin. Prussic acid, for instance, unites with the hemoglobin in the blood so that it can no longer take up oxygen, and a person poisoned with prussic acid therefore dies of a kind of suffocation.

Alcohol also has a very curious action on the red cells. Somehow or other it makes the union of hemoglobin with oxygen much more stable than it usually is. The consequence is that it is not reduced by the tissues of the body as quickly as it should be. They are thus not burned up so well, and this is one of the reasons why people who take too much alcohol are inclined to grow fat, and why in many cases those who take much alcohol lose both mental and muscular energy and activity. The fire of life cannot burn brightly with alcohol.

THE NEXT STORY OF OUR OWN LIFE IS ON PAGE 935.



Photo, courtesy Metropolitan Museum of Art.

An interesting model of a boat found in a tomb.

EGYPT'S FASCINATING STORY

A SECRET is one of the most fascinating things in all the world. When you have found it out, part of its charm may have flown; but as long as you are kept wondering about it you are on tiptoe with expectation and excitement. Do you know of a country that has kept shining secrets hidden for centuries? Golden sands, lying smooth and silent beside the stream of a long blue river, gave no sign of brilliant pageants that had long ago passed back and forth there. Rock cliffs stood calm and blank under the blazing sun, never revealing a hint of the treasure they were holding. "Egypt"—the word itself looks cryptic, secretive. The Nile, the ancient sacred river, the very life and heart of the long, narrow land of Egypt, seems to smile like a deep-eyed, beautiful creature always suggesting wonderful things that might be uncovered at any moment.

Beckoned by these gleams of mystery, and guided by a thread of historic truth, scholars have set themselves to learn some of the age-old secrets hidden behind Egypt's strange smile. Patiently they have dug and sifted the sands, persistently they have pierced the doors of the rocks, seek-



Thothmes III.

ing knowledge of men and events that made up the history of the early centuries of civilized life.

We know that man had learned much in the way of civilization before he invented writing which provided a way of recording deeds for the benefit of generations that would come after. This was the beginning of written history; and the earliest written history of the land of Egypt that has yet been discovered was probably inscribed more than six thousand years ago.

Six thousand years! It is a long reach of time to try to look back over. You will need the help of imagination's eye. But, while you count your own life-story by days and weeks, we reckon the life-story of old Egypt by stretches of hundreds of years, catching sight of only the higher spots in the long, long prospect.

We have said that the Nile is the life of Egypt, and truly, for without the river there could be no habitable land in that sandy, rainless region. The desert, stretching all across northern Africa, pauses on the threshold of this river valley, whose waters come down from mountains far to the south.

With melting snows upon the mountains and flooding spring rains the waters of the upper river are swollen. Down and down they flow—down and down and down, until the lower valley lies a broad expanse of water dotted here and there with palm groves. Irrigation canals and reservoirs catch the surplus—for the Egyptians learned, ages back, to control this water supply—and the rest spreads over the fields, depositing upon them the rich, black earth which will renew the fruitfulness of the soil. But when the river has shrunk back within its narrower limits, the water must be lifted to the higher fields in order to keep the crops growing. Next to the actual carrying of the precious liquid by hand came a simple primitive device which has been kept continuously in use until to-day. This is a sweep made up of a pole and a bucket, like our old well-sweeps. The bucket, dropped into the stream to dip up a load of water, is swung up and around by means of the pole; then the water is poured into an irrigation ditch or into another bucket, to be swung to a still higher level. This device, called the *shadoof*, is pictured on page 2547. It groans and creaks as it carries on its steady necessary work to help provide food for the life of the land. What wonder that the men of Egypt worshiped their river, source of life itself to them?

A KING'S TOMB AS HIGH AS A HILL BUILT BY AN ARMY OF MEN

Perhaps the first thing that you would look for if you went to Egypt would be the pyramids—particularly the Pyramids of Gizeh—built to be the tombs of pharaohs when Egypt was young and the sovereigns lived at Memphis, the city of Menes, who united Upper and Lower Egypt into one nation perhaps about 3400 B.C. and founded the First Dynasty (or family) of rulers. Never have kings or conquerors since had such massive tombs. The Great Pyramid, largest of them all, was made for Khufu, or Cheops, a monarch of the Fourth Dynasty of kings, reigning about 2900 B.C. Its base is a huge square which was originally 755 feet long on each side, inclosing nearly thirteen acres of ground. With the exception of a few passages and the funeral chamber, the structure was solid, layer upon layer of enormous stone blocks

piled one upon another, each layer covering a little smaller square than the one before, until the top stood 482 feet above the ground-level. (It is now only 451 feet high.)

What a scene must have been the building of such a mass, with such a base and such a height, so many centuries ago! You have watched motor trucks carrying bricks and stones for the buildings of to-day. Not so was the material for the pyramids transported. In the largest one of them there was enough stone to build a middle-sized modern city. Many more than two million limestone blocks, of about forty cubic feet each, were hewn from the hills on the other side of the Nile, floated over the river, and by enormous effort of human labor were drawn, pushed or rolled to their places in that monumental pile. Rollers, levers, pulleys and ropes were the contrivances used; the roadway was oiled; and a mighty inclined causeway was constructed, up which the material traveled to the plateau of the pyramid. All was controlled by the most careful engineering skill, all planned with the most exact calculation. We marvel now to see how each great block fitted upon its neighbor with astonishing perfection, with so narrow a seam sometimes that it can hardly be seen. The whole work is supposed to have taken from twenty to thirty years and to have been done by about a hundred thousand men at a time.

TOMBS AND TEMPLES, THE SYMBOLS OF FAITH IN IMMORTALITY

The outer casing was made of smooth and polished blocks, to form an even shining surface for each face of the four-sided mass; but these are now gone, leaving a series of rough, irregular steps, each so high that to climb them you would have to be pulled and lifted up by native guides.

Standing before the pyramid itself was the pyramid temple, where services were held on feast days; and from this temple a long covered causeway led down to the lower level beside the Nile, where a portico, or secondary temple, stood. Imagine the boats coming along the river and drawing up in front of the lower temple, where priests in their robes and courtly persons in their festive garments, disembarking, would gather for preliminary services before forming a solemn

procession through the causeway to the upper temple to perform their rites in memory of the king who had superintended the building of these impressive and massive memorials.

And what was the object of all this thought and labor and expense? Simply to honor and glorify the reigning monarch and provide for a safe place for his small but sacred body after death? More than that: it was a symbol of a deep and solemn faith in the immortal life of the soul. The most important thing to do was to plan for the soul's safety and happiness in the after-life, and as this was believed to depend upon the body's being kept whole for the use of the soul, every safeguard must be prepared to protect it from destruction.

There are several groups of pyramids not far from the modern city of Cairo, but none of the others can vie with those of Gizeh in size or importance. The earliest of them were "step" pyramids, built without the outer layer of facing-stones that came into use afterward. Among the pictures called "Buildings of the Old World," you will find glimpses of many interesting constructions in Egypt.

A pyramid was a tomb for the king or

one of his family. Lesser folk than royalty had burial places of different sorts. Near the pyramids were the tombs of officials and nobles connected with the court of the king. They are the kind we know as "mastaba" tombs, so named from the long, flat Egyptian benches

which they resemble. One of these tombs, in a cemetery near old Memphis, was built perhaps 4500 years ago by

Perneb, Lord Chamberlain, Keeper of the Crowns, and "Companion" to his king, probably one of the kings of the Fifth Dynasty.

In it, as in the other mastaba tombs, there were several chambers: a chamber for Perneb's statue carved in cedar; an adjoining chamber shut off from it by a thick wall with only a slit of an opening, through which the family and friends could look at the figure; and the main chamber, entered through a vestibule.

The walls of the main room were covered with painted scenes telling the story of the man's daily-life pursuits and showing processions of slaves bearing offerings for his use. One end wall contained the false door, before which food and other gifts were to be placed; and beyond it, but walled from sight, was the top of the



Toys of Egyptian children 4,000 years ago.



A dressing-table 3,500 years old.



An Egyptian toy boat made 4,000 years ago.

deep shaft leading down to the burial chamber.

There is good reason for believing that after a few generations Perneb's descendants began to neglect the duty of bringing him offerings, that the tomb gradually passed from their thought and attention, and that robbers broke in to carry off all that was of value. In time the desert sands drifted in, nearly filling the chambers. While the walls of neighboring tombs disappeared in the long course of centuries, the stones being carried off to be used for building houses or other tombs, Perneb's escaped this fate because it was made a dumping place for the rubbish cast aside by the ravishers. Then in our own century it came to light again under the spade of the excavator. Stone by stone it was taken down and carried across the ocean to New York City, where it was all put together again inside the Metropolitan Museum of Art.

TOMBS THAT REVEAL THE VERY LIFE OF THE PAST

There, standing opposite the entrance door, you may see on each side of it a picture of Perneb, staff in hand, as if he were about to walk off to attend to some court duty. Inside, you may study the many pictures on the walls, noticing how the people dressed and what they liked to eat and to do. You may face the false door, imagining yourself a member of Perneb's family about to place some choice little gift upon the offering table, that it might be at his disposal whenever he should need it.

For the Egyptians believed that, in some mysterious way, in the new life to which he had gone the departed person would need the same sort of things that he had owned in his earthly life. So, into the burial chambers of royal and rich persons were put their valuable ornaments and other possessions, besides furniture, clothes and food for the use of the spirit of the departed. Models of human figures were left there, too, to become companions and servants in the new existence. Every one of these figures and objects was believed to have a double which would be ready for the double of the dead person at any time.

The sight of these personal belongings brings us closely into touch with the Egypt of three or four thousand years ago. In the great museums at Cairo,

Berlin, Paris, London, New York, Boston, Chicago and elsewhere we may see both curious and beautiful reminders of Egyptian life. In the British Museum, for instance, there are cases full of treasures, including dolls with clay beads for hair, other toys, little worn shoes and sandals from the feet of children, a fine lady's dressing-cabinet fitted with jars and bowls for ointments and other appointments, her elbow-cushions and dainty slippers. There, too, are the palette and paints of the scribe, musical instruments—in fact, hundreds of things that bring us almost face to face with the men, women and children to whom they belonged centuries ago.

It is the same in the Metropolitan Museum, in New York, where you will find the most interesting models of buildings and boats, of masters and servants. A great man sits upon the deck of a boat, with musicians to entertain him, lotus lilies to furnish beauty, and scribes to give him reports, as well as rowers, steersmen and fishermen. There are other models of slaves at work in granaries, bakeries or stables—busy with the day's work of gathering or preparing food for many mouths.

These little models were made to be placed in tombs, and there they remained, shut away from the light and from the knowledge of men for centuries upon centuries.

All these preparations, we must remember, are signs of a strongly fixed belief that the soul would live on and on—a belief which was the central motive of all Egyptian religious thought. Upon the walls of the tomb-chambers there are many representations of the gods worshiped in life and to be met in the nether world after death. It is natural that the sun should have been generally adored as a ruler and life-giver in a land where the days were always flooded with sunshine. As the god Re (or Ra) he sailed across the sky in a celestial boat every day, to return in another boat upon another stream through the underworld.

OSIRIS, ISIS, HORUS AND OTHER GODS OF THE EGYPTIANS

From among the many local deities in different parts of the land a few became generally recognized and worshiped. Foremost among them was a family group of three—Osiris, Isis and Horus—around whom the following legend was woven.

THE FIRST GREAT WONDER OF THE WORLD



Of all the marvelous monuments that remain to-day to tell us of the power and glory of the past, the pyramids of Gizeh, which we see here, are the most amazing. The largest of these, known as the Great Pyramid, was built by a pharaoh named Khufu, or Cheops, for his tomb. It is the largest building in the world, and was originally 482 feet high. The area covered by it is nearly thirteen acres.

When the sun-god had been raised to the heavens, Osiris took Re's place as king upon earth, ruling wisely and beneficently until he was deceived and slain by his wicked brother Set. Isis, the wife of Osiris, after great sorrow and trouble found the body of her husband, and with the help of the jackal-god Anubis prepared it for burial; then by the charms she used she brought back life into the body. Osiris, unable to return to his earthly kingdom, became from that time the ruler of the nether world—lord of departed spirits. But Isis did not rest until their son Horus had avenged his father's death by overthrowing Set and taking his place upon the throne that had once belonged to Osiris.

Anubis, the jackal-headed deity, became known as the god of embalmmment and the guide of the spirit to the realm of Osiris. Thoth, with the head of an ibis, was looked upon as the patron of letters, the originator of the fine arts, and the one who acted as scribe to the gods. The sky-goddess—sometimes as Hathor with a cow's head, sometimes as Bast with a cat's head, sometimes in other forms—had especial influence over the life of women. Osiris was the good being, Set the god of evil and harm. Horus, whose symbol was a falcon, had been originally connected with the worship of Re.

PREPARING THE MUMMY FOR ENDLESS YEARS OF WAITING UPON THE SOUL

Because the life of the soul could not go on if the body were not preserved, an elaborate process of embalming it was gradually developed. For the rich and important a long and costly process was used, the very same process, it was claimed, that Anubis had used in preparing the body of Osiris. With accompanying prayers and rites the embalmers proceeded to remove perishable organs, to cleanse the spaces with palm wine and to fill them with aromatic material; then they let the body soak for seventy days in a preservative bath, becoming "slowly impregnated with immortality," as someone has expressed it. Meanwhile the family waited in a sorrowful atmosphere, living on plain, coarse foods; allowing themselves to go unkempt; and mingling their tears over the thought of their loss.

The next step in caring for the mummy was to place amulets and rings and dried flowers upon the form and wrap it in layers of linen bandaging soaked in gums,

with bits of preservative substances tucked in. When the mummy was encased in his coffin he looked like a statue of himself for the coffins were modeled to follow the outlines of the swathed form, the head covering being made to reproduce the features of the dead person, with eyes of enamel as a final touch. A painted wooden casket or a carven stone sarcophagus made a further guaranty against the body's being molested. Less costly methods and materials were employed for those whose purses were not well lined with gold; but everyone hoped for the survival of his soul through the careful preserving of the body.

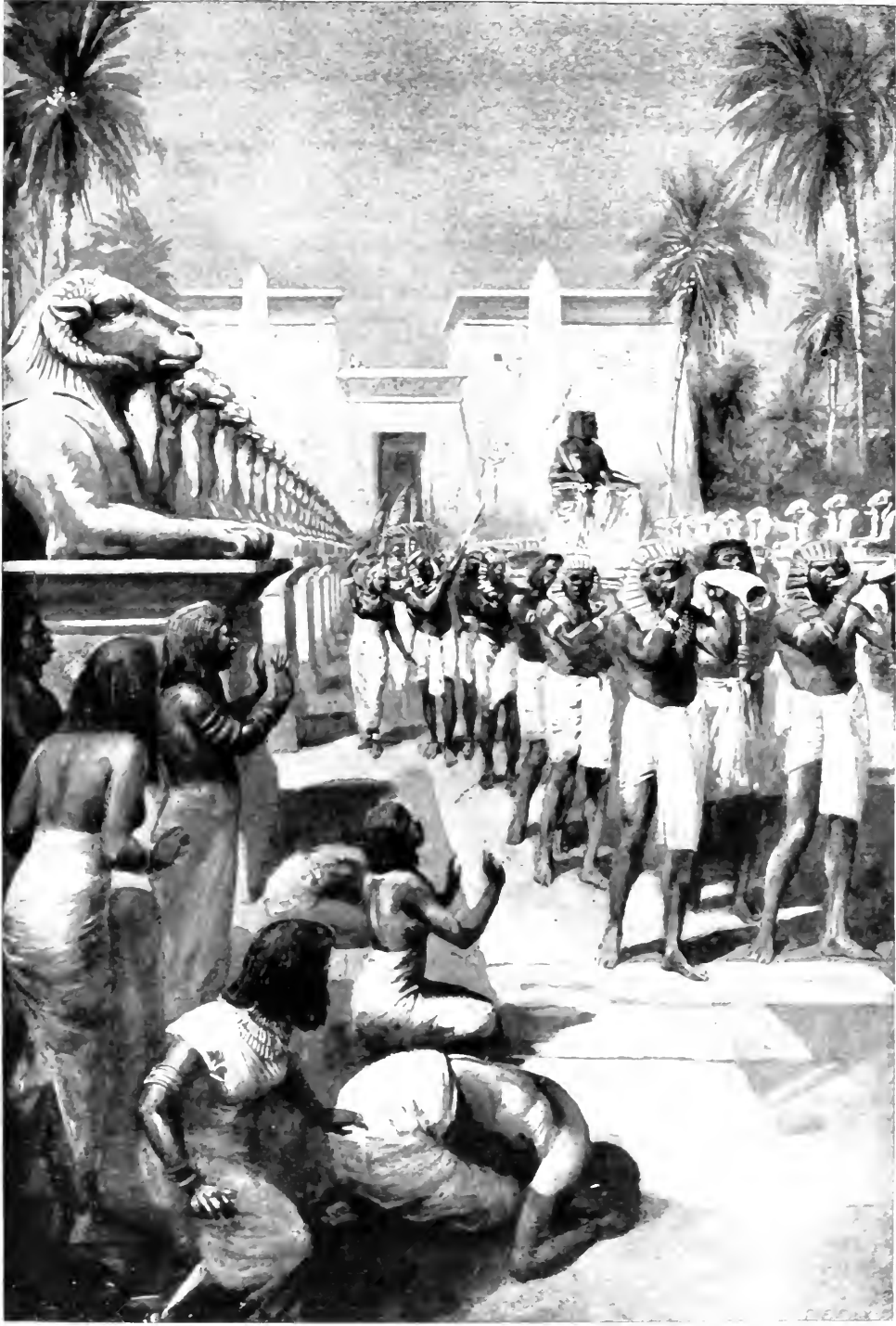
The Old Kingdom, with its centre at Memphis and its pyramid monuments, had slid into past history before the Eleventh Dynasty brought in a new era of activity, centring at Thebes, farther up the Nile. The kings and nobles of the Theban period were buried in splendid rock sepulchres, in the Valley of the Kings' Tombs, along the limestone cliffs opposite Thebes. Far into the rock they penetrated, making long galleries and halls to approach the burial chamber with its huge sarcophagus of stone.

THE SPLENDID TEMPLES AND PAINTED WALLS OF ANCIENT EGYPT

Near the ruins of Thebes are the still-imposing remains of magnificent temples, for the pharaohs built the gods dwellings far grander than their own palaces. Even to-day the great halls, imposing gateways and rows of pillars form a most impressive and beautiful sight, whether in brilliant sunshine or deep purple shadow. As we gaze at them we fancy them once more in their first glory, with long processions of chanting priests and priestesses, a gorgeous display of magnificence when the king came to pay his worship, amidst the stately monuments of gold and silver, adorned with ivory and precious stones.

If we look at the walls and columns of the temples, at the solid vaults, at the coffin-cases, at the sculptures and the wall-paintings, we shall find most of them covered with picture-writing. Until a century ago no one could guess what it all meant. Then at Rosetta, near Alexandria, a soldier of Napoleon's army found an engraved stone which served as a sort of key to unlock the mystery. Of this stone, now in the British Museum, you may see a picture in the story of How Man Learned to Write.

A PHARAOH ON HIS WAY TO THE TEMPLE



The magnificent temple of Amen at Karnak was the greatest of Egypt's ancient shrines. To its shrine the Pharaohs went with all the state and pomp that it was possible to assume, and as they proceeded up between the impressive avenue of sphinxes, amid the sounds of music, to the portals of the temple, they were regarded with reverence by the onlookers; for, when one of the Egyptian monarchs went thus to worship, he was supposed to represent the whole nation. Amen was usually represented as a ram.

**HOW MEN SOLVED THE RIDDLE
OF THE ANCIENT WRITINGS**

On the stone, known as the Rosetta Stone, is a certain decree about keeping a king's birthday, and the same decree is given in three different kinds of writing. The lowest is in Greek, which scholars know well; the top is in the Egyptian picture-writing used on the monuments, and the middle one is also in the Egyptian language, but in a more running kind of writing used for everyday purposes by the people.

Learned men, who love to find out the puzzles of the past, set to work to translate this decree. They compared it with certain lists of kings' names they had already studied, till at last it was all straightened out and the values of the signs were discovered, so that we can now stand by and listen to those who know hieroglyphics while they translate the old Egyptian writings almost as easily as if they were in a modern language.

This discovery and study have opened up to us the old books and chapters of books which are continually being found in the tombs. These were in long rolls, or *papyri*, so called from the material on which they are written, the inner part of the papyrus reed which grows in such profusion on the banks of the Nile. From the name *papyrus* comes our word "paper."

Part of the work of the scribes was to make copies of the papyri; and the one most copied is called the Book of the Dead, sections of which are believed to be older than the pyramids themselves. Certain chapters of this book were always laid beside the mummies, to instruct them what to say and how to behave in the underworld. Our interest in the Book of the Dead is caught partly by the illustrations, but we find it fascinating, too, for the teaching it gives about the religious thought of Egypt: how men tried to fit themselves in life for a happy hereafter, how they expected to be judged, and how they believed they would live and work on their way through the underworld. For instance, it gives a very definite picture of the trial of a man's soul before forty-two judges in the hall of Osiris, when Anubis and Thoth would weigh his heart in the balances of justice and he would have to answer many questions. There are in the book, too, hymns

to the gods and magical texts. The British Museum has a fine copy of a large number of its chapters. Besides this and other religious books there are many papyri of great age—fairy-tales, war poems, medical and astronomical books, and rules for behavior.

Every year diggings and explorations are being carried on in the search for more temples and tombs, inscriptions and papyri, to fill in the gaps in our knowledge of the story of old Egypt.

**A KING WHO REIGNED NEARLY
SEVEN THOUSAND YEARS AGO**

Different scholars place the beginning of the story at different dates. The first historical king of all Egypt is put by some in the forty-fifth century before Christ. But some think that Menes, who turned the course of the Nile, united the two kingdoms and founded the First Dynasty, lived about 3400 B.C. Before him there are legends of god-kings and heroes, and of kings of small states. Specimens of very old pottery, with pictures upon it of soldiers and boats, like children's drawings, give an idea of the first known life on the Nile long before Menes.

For the sake of convenience, in dealing with the great number of kings that followed Menes we generally group them into thirty dynasties. Twenty-six of the dynasties ruled between the accession of Menes to the throne and the conquest of Egypt by the Persians, nearly three thousand years afterward. Four others were added before Alexander the Great took the land of the Nile into his empire in 332 B.C. The names are gleaned from lists of kings, on tablets and papyrus, made from time to time through the centuries and still preserved.

When looking at inscriptions we can always distinguish a royal name, because it is surrounded by an oval line, supposed to be a cord tied in a knot to preserve the name from contact with common ones. This oval is called a *cartouche*. Before the king's name will generally be found some Egyptian words composed of a sign like an umbrella and an insect over two half-circles. These signs mean "King of the North and South," for Egypt is such a long, narrow country that it was long divided into two parts; and so we often hear of the double crown, which is made up of the red crown of North Egypt and the white crown of South Egypt.

**THE KINGS OF EGYPT WHO CALLED
THE SUN THEIR FATHER**

Each king called himself the son of a god, usually Son of Re, or the Sun, which is shown by a goose and the sun-disk with a dot in the middle. The names of the kings are made up chiefly from about a dozen signs which we meet with continually in every inscription.

Very little is known of the kings of the first three dynasties. It was under the rule of the fourth, as we have already seen, that the three great pyramids near Cairo are believed to have been built by Khufu, Khafra and Menkaura.

If we would see the lifelike features of Khafra, and note how he sat to give audience to the overseers and officers of his great building works, we can find a cast of his remarkable portrait in the British Museum. There he sits on his throne, surrounded by memorials of the officials who superintended the building of the second pyramid.

**THE MERCIFUL KING WHOSE BODY
WAS LOST AT SEA**

The museum possesses part of Menkaura's skeleton and fragments of his coffin, with an inscription saying he was just and merciful. The rest of the coffin and mummy were lost at sea on the way from Egypt. With Menkaura the power of the Fourth Dynasty dropped away. His statue has been described as that of a "bourgeois royalty, doing his best to look as dignified as becomes the wearer of the double crown, and failing absolutely"—a contrast with the fine dignity of Khafra.

Not far from the Pyramids of Gizeh is an enormous figure hewn out of the living rock, with a human head and the body of an animal—the Sphinx—so large that it could scarcely be got into the largest of our modern buildings. From time to time, through the centuries, the sand which drifted over it has been cleared away, and the shape brought to light. An inscription between the forepaws refers to Khafra and seems to show his connection in some way with the great mysterious form.

**THE GREAT STONE FACE THAT HAS
LOOKED UPON THE WORLD FOR AGES**

The face looks out to the far horizon with calm dignity and detachment, changeless through thousands of years, except for the wear of time and the wanton mischief done to it when Mo-

ammedan soldiers used it as a target. It has an impressive majesty of its own. Some travelers have been astonished at noticing how like are the thick lips and the cast of face to those of some of the country girls of Egypt to-day.

Another striking likeness that connects far-away times with the present is found in the wooden statue of a fat little overseer, whose amusing face makes us smile; though we feel that his sharp eyes would soon find out any wrongdoing in the workers he had to oversee, perhaps four thousand years ago. When this statue was raised from the bed of sand and dust where it had lain for centuries, the watching people called out in amazement: "Shekh el-beled!"—"the chief of the village!" And the statue keeps this name now.

**HOW ABRAHAM ENTERED INTO THE
BUSY LIFE OF THE NILE VALLEY**

Many interesting tombs belong to the period of perhaps 2000 B.C. or earlier. One of them has wall-paintings representing the arrival in the country of a family such as that of Abraham, the great founder of the Jewish race. The story of his visit to Egypt in search of food, when there was a famine in his own country beyond the Isthmus of Suez, is familiar to us in the pages of the Bible.

We can well imagine that Abraham would tell his son Isaac stories of this visit to Egypt; that he in turn would tell them to his son Jacob, and Jacob to his sons, among them his favorite, Joseph. Let us follow this son after he was sold by his brothers. His sad journey lay over the "Bridge of Nations," the Isthmus of Suez and the Peninsula of Sinai, to slavery in Egypt.

Baskets made like those in the Egyptian rooms at the Metropolitan Museum might well have been those which the chief baker carried on his head in Joseph's dream; the models of the granaries show how corn was stored, and bring to mind Joseph's great work of building storehouses and gathering in grain to prepare for the famine that lasted so long, because Father Nile brought too much or too little water to the wide fields.

**JOSEPH, HIS BRETHREN AND PHARAOH,
WHO WOULD NOT LET HIS PEOPLE GO**

Fashions changed so little in Egypt for centuries that we might imagine that the little statue of a treasurer was Joseph



AMEN

Sculptured head of Amen, whom Amenhotep IV replaced by Aten for a time.

himself. We might fancy him earnestly discussing affairs of state with the king, to whom he became as a son, or traveling down the Nile on a tour of inspection in a boat like the model in the case near by. You remember how Joseph's brothers, then his old father Jacob, traveled to Egypt and were given land by the king. There the children of Israel settled and increased in numbers.

Very little is known about the history of Egypt at this time, for the kings who ruled then—believed to be a race of foreign invaders—destroyed monuments instead of setting them up. But when these Hyksos, or Shepherd Kings, passed away, the Eighteenth and Nineteenth Dynasty pharaohs, builders and soldiers, whose names are familiar and famous, took their part in Egypt's history. These were the years when Israel lived in the "House of Bondage." Among these rulers was Thothmes III, who inscribed and set up the great obelisks which we call Cleopatra's Needles, though Queen Cleopatra lived centuries later.

One of the tall stone shafts now stands in London, the other in Central Park, New York. Thothmes III was one of the first kings of Egypt to make war across the Isthmus of Suez, both on the nations in the mountains of Syria and in Mesopotamia, the valley of the two great rivers beyond the desert.

Part of his reign was shared by his queen, Hatshepsut, who, as sovereign in her own right, had been chosen "king." She, often called the Queen Elizabeth of Egyptian history, sent most interesting expeditions to discover unknown countries, and had an account of them, with fine illustrations, engraved on the walls of a magnificent temple which she built near Thebes. There is much that is interesting about this vigorous queen, who for political reasons tried so much to look like a man that she had a beard added to her portraits.

Of this same dynasty—the Eighteenth—was Amenhotep IV, who changed his name to Akhenaten in honor of the god Aten, a universal, or world, god, whose worship he strove to substitute for that of Amen, the deity of Thebes, and other local gods. Amen's name was replaced by that of Aten on statues and monuments. Great temples were built to Aten, and cities were founded in his name. "Truth" was the precious thing which the king most desired. His orders to painters and sculptors were that they should "let the chisel and the brush tell the story of what they actually saw," instead of following the conventions rigidly prescribed by priestly rule.

But the priestly party was strongly set against him, and the inherited faith of



AKHENATEN

The interesting features of Amenhotep IV, who tried to introduce the worship of a universal god Aten, and changed his name to Akhenaten.

PICTURES OF THE PEOPLE OF OLD EGYPT



Necklaces were an important part of the dress of the ancient Egyptians, and both men and women wore them. This necklace, 3,500 years old, is of shell-shaped ornaments of gold with precious stones.



Owing to inroads of conquerors and settlers, Egypt was peopled by various races. Here we see, from ancient sculptures, what some of the races were like. Numbers 1 and 2 show the aquiline, or eagle-nosed, type; 3, the Libyan; 4, the Amorite; 5, the curly-haired type; 6, the sharp-nosed type; 7, the short-nosed type; 8, the forward-beard type; 9, 10 and 11, the straight-faced type; 12 is King Khafra.



In their custom of sitting on chairs, the Egyptians were more like modern Europeans than the people of the East. Their seats were not unlike ours, as may be seen from the chair with a back, which is 3,500 years old. The stool on the right folds up like a camp-stool. The seat is of ebony, inlaid with ivory.

centuries was too firmly rooted to be overthrown during the lifetime of one man. Akhenaten's son-in-law, Tutankhaten, was forced to yield to the pressure of opposition, to restore the worship of Amen and to change his own name to Tutankhamen. The opening of this young king's tomb in 1923 has made him a very real person to us.

Though Akhenaten failed in his effort to revolutionize thought and custom in the old land of the Nile, we find him the most interesting figure in all early history, the first *individual* in the written story of mankind.

PROUD CONQUERORS AND BUILDERS IN THE NINETEENTH DYNASTY

A little later, when the descendants of Jacob, the Children of Israel, had grown to be very numerous, they were harshly treated by the kings of the period, who had built up the empire again. Rameses II, a soldier-king and a mighty builder, is believed to have been the great oppressor of the Israelites, and we can see his face in the huge stone monuments he set up. Of more personal interest still is his mummy, which has been found with that of his father, Seti I, and those of others of his race. They have been placed in the museum in Cairo. Thus, the features into which so many looked with awe, perhaps even the little Moses, are known again to the world more than three thousand years after the great king's death. Of Seti I and Rameses II there are numberless stone portraits in statues and reliefs, giving us interesting impressions of them as men and as rulers. In the Metropolitan Museum there may be seen an earthenware bowl, covered with blue glaze and inscribed with the name of Rameses II, which may have belonged to the great king himself. There, too, is a door lintel taken from one of the temples that he built. As we look at it we wonder how many times his hand may have touched it as he passed in and out thirty centuries ago.

Magnificent were the temples and monuments set up by this dynasty of kings, the Nineteenth. Among them we find the massive ruins at Karnak and Luxor, near Thebes. Bricks such as the Israelites made for use in building store cities for their hard taskmasters; necklaces and jewelry such as they may have taken when they "spoiled the Egyptians," are here in the museum before our eyes.

In the great museum at Cairo and in the museums of many European cities we may find endless objects such as the king's daughter may have provided for Moses, whom she rescued and brought up in the palace itself—things which helped to frame his life from childhood onward. The toys and games, especially the animals, must have pleased him, and a garden with trees and a pond, like one that is pictured on a wall, would be delightful for a child to play in. The little Moses may well have heard music from instruments such as the pipes and harps preserved here, and he must have enjoyed sailing and rowing on the Nile in boats like the models on our museum shelves.

The wall-paintings from the tombs show in their bright colors how the Egyptians amused themselves in the time of Moses, as well as before and after. There are the gay parties with music and dancing; a father hunting water-birds with a sort of boomerang, the child holding on to his leg for fear of falling out of the boat; the mother gathering lotus flowers; the family cat retrieving the birds three at a time. This we can see on page 820. When the time came for lessons, reed pens, such as we can see, and red and black paints were the sort with which the boy must have learned to write. We can fancy how he must have enjoyed possessing one of those boxes of pens and paint, and can almost see him poring over the papyrus rolls which held so much of the learning of the Egyptians.

THE INFLUENCE OF EGYPTIAN LIFE UPON THE HEBREWS

The Ten Commandments, brought down from Mount Sinai by Moses after he had led his people out of Egypt, are foreshadowed in the forty-two commandments in the Book of the Dead. The making and worship of the Golden Calf which so angered the great leader, was suggested by the ancient worship of Egypt, brought home to us in endless forms by paintings and images of every description, as well as by the mummied forms of sacred bulls and other animals held in reverence.

For about a thousand years after the brilliant line of the Rameses dynasty, the history of Egypt, on the whole, was one of gradual decline and gathering trouble. It was during this time that the priests of the splendid temples became

THE MIGHTY SCULPTURES OF OLD EGYPT



Here are two gigantic statues set up near Thebes about 1400 B.C. They are the largest seated figures in the world, and are made of sandstone quarried near the Nile. One of them was called the Singing Memnon, because of the sound said to be given out by the stone when warmed by the morning sun.



The great Sphinx is the oldest colossal sculpture in the world. With a lion's body and a woman's head, it lies on the edge of the desert, carved out of a huge rock protruding from the sand. It is about five thousand years old. This strange statue has always proved very fascinating to imaginative minds.

richer and richer, more and more powerful, till at last they made themselves kings. When examining the mummies and their cases we notice how many are those of priests and priestesses, door-keepers, incense-bearers, and other officers of the great religious colleges.

Dynasties of foreigners followed the priest-kings, and the country was breaking up into little states and everything was going downhill, when the kings of Assyria—the land of the two rivers—seeing their opportunity for conquest,

too, fell under a new great power that arose in Asia—that of the Persians.

The Egyptians took every opportunity to revolt against the Persians. Between the second and third revolts, in the fifth century before Christ, a traveler from Greece came to Egypt. He was an author anxious to collect material for his History of the Persian Wars. This was Herodotus, the "Father of History," who set down in a pleasant chatty way his impressions of the wonderful country, of the Nile in flood, of the pyramids and



This picture, drawn by Egyptians thousands of years ago, shows a man catching birds from a boat, while his little child holds his leg for fear of falling into the water. The mother is gathering lotus flowers.

began to attack Egypt on her own frontier, and then pushed their way over the Bridge of Nations. They overran the whole of the country, spoiling the harvests, so that the people starved, and the fine temples and monuments began to fall into decay. We find the account of all this misery in the story of Assyria in the descriptions given by the conquerors with swelling pride of their successes in Egypt.

Egypt revived after this for a little while under kings of the Twenty-sixth Dynasty, with their capital at Sais, not far from old Memphis. In their armies fought soldiers from Greece. But the Nile country was again devastated from end to end by the Assyrians till they,

other great buildings. Much of his interesting book we can read to-day, though Herodotus laid down his pen more than two thousand years ago.

The Persians in their turn were driven out by the world-conqueror Alexander the Great, of Greece. His stay was short in Egypt, but his brilliant passage has left marks for all time. He flashed across the desert to worship at the shrine of the god Jupiter Ammon, whom he claimed as an ancestor, and he planned and founded the great city of Alexandria, called after him, which under his successors became one of the most important cities in the world.

Three centuries before Alexander, as

we have noted, an Egyptian king had employed Greek soldiers and had allowed Greek traders to settle in the Delta. Before this Egypt had been closed to foreigners; but after the Greeks found their way into the country, little by little their cleverness in trade, their surpassing skill in art and their learning, spread Greek influence ever farther along the Nile. Naucrates became a famous Greek city during this time, and to-day explorers find Greek treasure of all kinds buried in various parts of the Nile delta.

THE WORK OF THE PTOLEMIES, GREEK KINGS IN EGYPT

The kings who succeeded Alexander were called the Ptolemies, the first of the name being one of Alexander's generals. They were great builders and restorers. To them we owe the Temple of Edfu and the temples on the Island of Philæ, near the great dam at Assuan. The Ptolemies favored the city named Alexandria after the founder of their fortunes, and started in it the famous library which, unfortunately, afterward burned. There, too, they founded a university to which came some of the most famous Greek scholars. Another Ptolemy built the tall lighthouse which, like the Pyramids, was one of the wonders of the ancient world. The flare from its top guided the shipping of Alexandria safely into its double harbor for long years; but not a trace of it now remains.

The same Ptolemy had the Old Testament, which was originally written in the Hebrew language and was understood by comparatively few people, translated at Alexandria into Greek. This beautiful language was soon to be carried over the known world and to become the language of scholars everywhere. Another good work of this same king was to have a history of Egypt and its religion written by an Egyptian scribe named Manetho, who knew Greek well. Though his actual records have been lost, other writers have made copies from Manetho, and thus the

lists of kings and other particulars which he carefully compiled have been of great use.

The Rosetta Stone was set up in the reign of Ptolemy V. We see now how it was that a Greek translation came to be put below in Egyptian writing. Both languages were then used in Egypt. And all the time that Egypt was becoming more and more Greek, "a shadow ever lengthening towards the East," was slowly creeping onward from Rome. It passed over Greece itself in the middle of the second century before Christ, and reached Egypt about a hundred years later.

It is a sad and absorbing story, how the end of the independent kingdom came, and how it passed into a Roman province. Upon this foundation Shakespeare constructed his play of Antony and Cleopatra. The beautiful Cleopatra was the last great ruler of the line of Ptolemies. Rather than fall into the hands of the invading Romans, she is said to have allowed a deadly serpent to bite her. So, when they came to her palace they found her in all her regal splendor—dead. In Tennyson's words, Cleopatra says:

"I died a Queen. The Roman soldier found
Me lying dead, my crown about my brows,
A name forever!"

From Menes to Cleopatra, what a perspective of years! As we look back again, much of the old life will seem so vivid and real to us that we can almost hear the dancing feet of children at play in little worn shoes, the sad wailing of mourners carrying the mummy to its hidden tomb, and the hum and clatter of workers building structures of such size and solidity that never on earth have they been outdone. And in and out, among the other sounds, ever the creak and drone of the shadoof, or water-sweep, winds, as the water is lifted from the river to terrace after terrace.

THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 909.



A PICTURE OF THE CATTLE OF ANCIENT EGYPT, DRAWN ON A TOMB 3,500 YEARS AGO

MICHELANGELO'S WONDERFUL CEILING



THE MAGNIFICENT CEILING OF THE SISTINE CHAPEL IN THE VATICAN

The Story of THE FINE ARTS



Three heads in the Sistine Chapel by Michelangelo.

LEONARDO AND MICHELANGELO

HERE and there, in the progress of the world, time and fate turn author and tell a story, and the older the world grows the more fantastic the tale seems. Such a story comes in the growth of Southern Europe from the twelfth to the fifteenth centuries.

At the beginning of this period people knew very little about the universe. Their only mathematics were simple addition, subtraction and multiplication. Their idea of astronomy was a kind of chart of the heavens, from which it was possible to understand certain simple phenomena, such as the habits of the moon that controlled the Church festival of Easter-tide. Greek and Roman culture, we must remember, had been stamped out of Italy by the repeated inroads of tribes of barbarians from Central Europe. It now made its home in Byzantium.

Over the continent of Europe, dark as night, a light of knowledge presently spread, directed from Spain, where the Moors were living as conquerors. Spain, in the twelfth century, was hundreds of years ahead of the rest of Europe; she had universities, observatories for the study of astronomy, and science laboratories, all the results of the Moorish occupation. The culture of the gifted Mohammedan

peoples spread among the Christianized countries of Europe and aroused

an intense curiosity.

It is difficult for us to realize how magical and wonderful was this awakening of a continent that seemed to have been lying asleep. Men were like children at school, learning for the first time the secrets of the world; hunger for knowledge sent them, often barefoot, with the student's wallet, begging their way from one university to another. To be a scholar in those days was to be a member of a secret brotherhood and to hold a sure claim on people's sympathy.

The same kind of curiosity was presently, in the fifteenth century, to lead to the discovery of the New World and to all the romantic and perilous voyages of the bold Elizabethan seamen.

In the meantime a sense of beauty, asleep until now, had begun to stir, as we have seen, in the countries where the Gothic spirit was felt, and first the Sienese, then the Florentines, Umbrians and Venetians were working and experimenting, generation by generation, toward a full realization of what great art meant.

In the fifteenth century came another element into art. Sultan Mohammed II conquered Byzantium, and the Greeks, flying westward, took refuge in Italy, bringing with them their

rich sense of beauty, their immortal traditions.

It seems strange that in Italy, at one time the stronghold of Greek and Roman culture, pagan beauty should ever have slumbered, and that the active presence of the Greeks should have been necessary to remind the country of their old dominion; but that is one of the strange chapters in the story of this medieval and awakened Italy.

The Christians of the early centuries were surrounded by the buildings and the arts of Rome and Greece, and seemed simply to be unaware of how beautiful they were. The Christians pillaged the pagan halls to get pillars and capitals of their churches, taking away all the marble they could; and this astonishing indifference to the claims of the past went on for a thousand years, until the Greeks themselves came back. Then the Italians looked about and tried to rescue from further destruction any monuments that remained, and they began to turn to the ancients for study.

A N INTELLECTUAL AND ARTISTIC GENIUS TRIES TO FLY

Thus we see three marvelous forces working to produce the paintings and sculpture of the fifteenth and sixteenth centuries in Italy—first the early renaissance in Tuscany, due to the Gothic spirit; then the growth of learning which infected artists and made them restless, unsatisfied with their own achievement; then again the return of Greek culture from the East.

All these forces centre in one Florentine painter, Leonardo da Vinci, who lived from 1452 to 1519. He was an intellectual as well as an artistic genius, a man of most brilliant gifts, any one of which would have set him apart and set him on a peak among his fellows. His many-sided ability ought to count in proving that artists are not always impractical and purely visionary.

There was scarcely a by-road, certainly there was not a highway of learning, that he did not explore. He foresaw several of the inventions which hundreds of years later were to revolutionize social life. He was philosopher, architect, engineer, physicist, chemist, geologist; he made experiments in the use of steam power and in hydraulics. At one time he was military engineer to Caesar Borgia; when he was over sixty, a guest in the Vatican, he neg-

lected painting pictures for the pope in order to try once more to work out his idea of a machine that would fly in the air.

It would seem that to this man fortune had already come with both hands full; as if that were not enough, another gift was tossed to him—genius in art.

Unlike many painters and poets, there was no need for Leonardo to wait till he was dead to be called great; he was truly the living master, greater than his greatest picture—one of the most fascinating and compelling forces in a century already colored with genius and gold-dusted with heavenly ideals.

L EONARDO'S FAMOUS PICTURE OF THE LAST SUPPER

Very little of Leonardo's art is left to us, and this is partly because of the accident of circumstances, partly the painter's own willfulness—in one immortal instance—in working in a wrong medium, and partly his great distrust of self. It was as if he turned a searchlight of criticism upon his own work, to discover all defects, and by his very carefulness delayed bringing his work to completion. There are four great paintings of his left to us, and one of these is but a ghost of its own magnificence. It is the first of two pictures which leap to our thoughts when the name of Leonardo da Vinci is mentioned—The Last Supper.

Many people when thinking of the story of the Last Supper as told in the Bible think of Leonardo's picture of it—of that long table where Christ and the twelve disciples were seated, of the separate horror, fear and curiosity chasing themselves across the faces of the apostles as the Master said: "One of you shall betray me"; and one after another they asked, "Lord, is it I?" The expression in this picture of those human feelings, and of Christ's own superb and sorrowful indifference, is sheer genius.

T HE PITIFUL DESTRUCTION OF A NOBLE MONUMENT

The Last Supper was painted in a method that peculiarly reveals the workings of the artist's wayward spirit. It was done for the Dominican Friars of Sta. Maria delle Grazie, at the command of Lodovico Sforza, the Duke of Milan, Leonardo's patron. The artist was engaged by this nobleman, at a handsome salary, to execute various works of art, the chief being an equestrian bronze statue of the duke's father.

FOUR PICTURES BY LEONARDO



LODOVICO SFORZA



BEATRICE D'ESTE



MARY, SAINT ANNE, AND THE INFANT JESUS



THE MADONNA OF THE ROCKS

PICTURES BY THE WORLD'S GREATEST ARTIST



MICHELANGELO'S CONCEPTION OF THE CREATION OF ADAM—FROM THE SISTINE CHAPEL.



THE THREE FATES, BY MICHELANGELO

SOME OF MICHELANGELO'S NOBLE FIGURES



THREE OF THE NOBLE FIGURES ON THE CEILING OF THE SISTINE CHAPEL, ROME



THE HOLY FAMILY, BY MICHELANGELO, IN THE UFFIZI, FLORENCE

Upon this work Leonardo spent the best of sixteen years, tortured by his inability to work out his own superb ideal, again and again making a new sketch and beginning the figures afresh. At the end of the sixteen years the model was ready to be cast in bronze and was temporarily set up in an archway outside the duke's home, Milan Castle. Its fate is one of the sad stories in Italian history. Sforza's enemies, the French, had long been threatening him; now they besieged Milan, and the equestrian statue—the labor of years—was demolished by the archers of Louis XII.

L EONARDO MOST LABORIOUS WHEN HE WAS MOST IDLE

While Leonardo was busy on this group, however, he was working on a great number of other commissions, and among them the very important painting of The Last Supper on the walls of Sta. Maria delle Grazie. When the artist received the order to execute this work he felt something very like ecstasy; here was a subject he had yearned to paint. He made a great number of chalk studies, and the remnants of these are now widely scattered, the best being in the Accademia of Venice, and some rather fine heads in the library at Windsor, England. South Kensington Museum treasures some notes made by the artist describing the various attitudes and expressions of the apostles.

Presently Leonardo began the actual painting, and soon he was standing before it in his characteristic attitude of self-distrust and fastidious criticism, an ever-forward reaching to the ideal which was secret to his own soul, and was to his work what the sun is to the moon.

Seized by a sort of fury of vigor, he would toil from dawn to dusk without food. Then there would come on him strange moods when he would stand motionless, staring at the composition for an hour or two; and after this spell of thought he would leave the painting untouched for several days. When questioned on these habits by the prior, who, good man, thought the artist was merely wasting time, Leonardo explained that when he was most idle he was really most laborious.

R AGS AND TATTERS OF GREATNESS CLING TO THE FRAGMENTS OF A PICTURE

For several years Leonardo divided his energy between The Last Supper and the equestrian statue. Sometimes the artist would be seen to leave the group at Milan

Castle and walk through the town in the hot midday to the convent beyond the gates. There he would add a few illuminating touches to the painting, and return to the castle.

In 1498 the picture was finished. It is a misfortune which can never be made up to us that the artist refused to work in fresco, which does not admit of the constant retouching that his ideals demanded. Instead, he painted in oils on the stucco surface of the wall. In a very short time the fabric crumbled, and the picture stands now in ruin. Although many copies have been made, the rags and tatters of greatness clinging to the fragments of the original make the finest of them seem a sorry imitation.

The other most talked-of picture by Leonardo is of a very different kind—a simple portrait of a Neapolitan woman, called La Gioconda, and known as Mona Lisa. In this face the artist painted his mastery of knowledge of character. As in the case of The Last Supper, he himself was standing apart, studying, as an intellectual exercise, the human emotions which stamp a face just as much as the definite features do. We can never feel, for instance, that Leonardo liked or disliked Peter or Judas, or liked or disliked Mona Lisa. He was fulfilling what he felt was the artist's vocation in figure-painting—the presentation of the human soul.

A PICTURE THAT MUST HAVE BEEN WORTH 4,000 GOLD CROWNS

La Gioconda was just an ordinary woman, and she hid her thoughts under an elusive, inscrutable smile. Leonardo spent four years painting the smile, and her thoughts. In its early condition this masterpiece must have arrested all men's eyes, and have been well worth the 4,000 gold crowns which King Francis I paid for it when Leonardo took it with him to France. The sky was very blue, and the Neapolitan's face was very fair, with sparkling eyes and pretty, red lips. Even now, with this brightness faded, it is one of the wonders of the world. It seems to be Leonardo's own way of stating a very old maxim—Mortal beauty perishes; Art remains.

Leonardo da Vinci is an eternal lesson to young students who want to paint before they can draw. Into the preliminary studies for his pictures he put an immense amount of care, and these char-

LEONARDO'S SMILING LADY



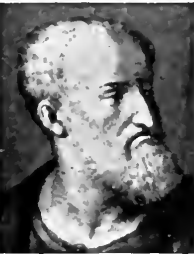
MONA LISA, THE MOST FAMOUS PORTRAIT IN THE WORLD. BY LEONARDO DA VINCI

coal drawings not only foreshadow the paintings but mirror the genius which inspired the artist in all his work.

England has in her possession a treasure which many other nations envy, and by some curious fate it is tucked away in a corner of the Diploma Gallery at Burlington House—a collection of pictures very few people go to see. This treasure is a cartoon by Leonardo, one of the studies in charcoal for the group, Mary, St. Anne and the Infant Jesus, now in the Louvre. The pure and lovely face of Mary is Leonardo's conception of the beauty of motherhood. It is a work of a supreme master.

destined to be lost. One of the paintings we should most like to have seen is a battle scene he worked at for some years in Florence. It was part of the decoration of the Council Hall, and the work was intrusted to Leonardo and Michelangelo. Thus two of the masters of the world, in whose two styles all styles meet, were laboring under the same roof. They were already known to each other. Leonardo was over fifty, Michelangelo still young.

It would be difficult to find two men differing more from each other in the pursuit of a common ideal. There never was an artist who brought less feeling and



ANDREW



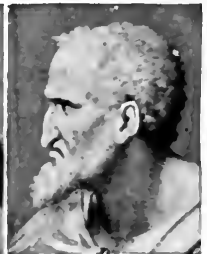
JUDAS



JESUS



JAMES



SIMON



THE MASTERPIECE OF LEONARDO ON A WALL IN MILAN—THE LAST SUPPER

There is a painting in the National Gallery, London, which has long been attributed to Leonardo but is now thought to be chiefly the work of Ambrogio de Predis, one of his pupils. It is called The Madonna of the Rocks, and is a copy of the original picture of this name by Leonardo, now in the Louvre. The French thus own three of Leonardo's four great pictures—the Mona Lisa, The Madonna of the Rocks, the Madonna and Child and St. Anne. The ruins of the fourth, The Last Supper, are still to be seen in Sta. Maria delle Grazie, Milan; and there are also some very fine portraits attributed to Leonardo, among them Lodovico Sforza and Beatrice d'Este.

A great deal of the artist's work was

emotion, and more intellectual force, to bear on his pictures than Leonardo da Vinci; but in Michelangelo's painting and sculpture thought did not take the first place; rather he flung his own joy, his own sorrow, into stone and into painted figures, a restless pent-up spirit throbbing its way to freedom. He was essentially a sculptor, and his pictures show his vivid passion for line and form. To him, the body of man was indeed God's greatest work, and he paid little attention to landscape, light and shade, atmosphere, or any other aspect of natural objects.

Michelangelo, sculptor, painter, architect, poet, was the last of the great Florentines. His work seemed like a mighty challenge to the rest of the world, and,

heard across the centuries, those spiritual trumpets are still faintly booming. The old-new Greek culture had laid its hold on his imagination and he had already inherited very nearly three centuries of Tuscan art: two influences which were like live wires, twisted together, fire-making.

This impetuous and forcible genius was naturally a great leader, and he founded in Rome, where he chiefly worked, a school which influenced the energies of nearly all the artists of Italy.

In the realm of painting Michelangelo's greatest achievement was the decoration of the ceiling of the Sistine Chapel in the Vatican. This work he undertook not very willingly, at the command of Pope Julius II in 1508. He said to the pope, rather querulously, that sculpture, not painting, was his trade, and that Raphael, the painter of Urbino, was much more likely to do the ceiling well. But the pope insisted—for the great good fortune of us all—and Michelangelo set to work, only reserving to himself the final comment of thenceforward signing all his letters, "*Michelangelo, Scultore.*"

A CHAPEL WHICH STANDS ALONE IN THE NOBLE HISTORY OF ART

It is difficult for people who have not seen the Sistine Chapel to realize this vast piece of painting, which stands alone in the history of art, stupendous, without the shadow of a rival. Michelangelo accomplished it in four years, almost unaided, as the artists he summoned to Rome to help him did not fulfill his requirements, and he sent them away in disgust.

It would seem to us that the planning of this mighty work alone might have been one man's sole labor. In the central vault of the ceiling are nine large pictures telling the story of Creation, the Fall of Man and the Deluge. Between the windows, spaces are filled with twelve figures of Prophets and Sybils who are foreshadowing the coming of Christ. In the spandrels are painted stories from the Old Testament, such as the Brazen Serpent and the Death of Goliath. The lunettes are filled with figures of David's descendants and the ancestors of Mary. These large divisions complete, Michelangelo used up all possible extra spaces to paint figures of youths and children. There are in all about two hundred figures, of immense size, painted in vigorous and sometimes unusual attitudes, the whole vast work charged with the extraor-

dinary vividness, aliveness and overweening strength which was the stamp of Michelangelo's creations. Looked at even now, after a lapse of 500 years, it would seem that those figures in the Sistine Chapel could step down, make some violent gestures and speak heroic words.

THE COLOSSAL SHAPES EXPRESSIVE OF THE ARTIST'S SOUL

When Michelangelo was about seventy he was ordered to paint The Last Judgment on the wall above the altar of the Sistine Chapel. This, his last fresco work, lacks the fire and force which mark the ceiling decorations, and shows what mannerism without genius can do.

Very few other specimens of the mighty artist's paintings are left for us. He never carried out the fresco designed for the wall of the Council Hall in Florence, where Leonardo was working. The cartoon foreshadowed a magnificence even surpassing that of the Sistine ceiling, but this, like many other treasures, was destroyed. The Deposition, in the National Gallery, London, ascribed to Michelangelo, gives some idea of his wild energy, his Titan-like strength. Another painting of his, The Holy Family, is in the Tribune of the Uffizi Gallery, Florence; and a very early picture of the same subject is in the National Gallery, London.

But when we think of Michelangelo, the painter, we think of the solitary and unrivaled magnificence of the Sistine Chapel, and we feel a little awed to think that one human being can be responsible for that immortal grandeur. We think of the artist toiling at the work, often through spells of great physical weariness and despondency, struggling to express his own soul in these colossal shapes.

THE LAST OF THE MIGHTY RACE OF FLORENTINE PAINTERS

His is a sad figure in a century of buoyant, happily inspired artists. To him genius was indeed the sorrowful gift. By temperament unfriendly and irritable, he alienated many people who might have made his life happier. His patrons did not reward him too well; poverty and family trials burdened him. When he died in 1364, an old man of eighty-nine, all the rest of his brilliant generation had gone, Raphael and Leonardo over forty years before. With him died the mighty race of painters who for three hundred years had made Florence famous.

THE NEXT STORY OF THE FINE ARTS IS ON PAGE 957.

FROM A BALCONY OVERLOOKING CAPULET'S ORCHARD



Romeo, a victim of a family feud, is under sentence of banishment for slaying Tybalt. Juliet and he, after a few precious hours together, are parting—forever as things befall, though they know it not.



Shakespeare reading one of his plays to Queen Elizabeth.

SHAKESPEARE'S PLAYS

PERHAPS it is not really wonderful that we do not know more about Shakespeare and his writings.

We must remember how differently actors and playwrights were regarded then. Now Shakespeare would at least be appreciated by our critics; in Elizabeth's reign such men as he were described as "low, common fellows."

His plays were written originally to be read by the actors, and not for publication in book form. There was no public eager to know all that could be found out about the most popular playwright of the day. No attempt was made to publish a collected edition of the poet's works till he had been dead seven years; and no full and separate life of him was written till he had been dead 127 years.

All we know of him comes either from brief official records; or from chance references to him in books or letters of his period; or by guessing from his writings where they seem to suggest personal information.

The last source of knowledge is very important, for we know, broadly, in what part of his life Shakespeare wrote nearly all his plays. Though he is the least personal of men, and rarely seems to think of himself, the

tone of his mind at different stages in his life shows in the choice and treatment of his subjects; and so we can follow with confidence some changes, otherwise unrecorded, in Shakespeare's life.

His plays throw light on the moods that passed over his spirit, though they do not disclose the details of his career.

As this is so, Shakespeare's plays should always be read with an understanding of when they were written, in relation to his growth in skill, character and fortune. For not only did he choose widely different subjects for his purposes as a playwright, but his style of writing changed as his outlook on mankind altered with the years, and the high spirits of youth sank into the gravity of middle age, which changed again into the peacefulness of old age.

Here, then, we must trace the succession of his plays, as, like the course of a stream, they reflect the scenery through which his life was passing.

Shakespeare's known writings were written in about twenty years. Eight of these years were before 1600, and twelve were after that date. He certainly wrote freely some years before 1592, and possibly after 1612, but we do not know clearly what his

writings were at either of those periods. Most likely they were corrections and additions to other men's plays, suggested by his knowledge of the actor's art, for he had been five or six years in London when he wrote his first full play, *Love's Labour's Lost*. The four or five years before his death in 1616 were no doubt spent chiefly in his native town of Stratford-on-Avon, and, as far as we know, his writing was limited to helping younger writers, like John Fletcher, who were his pupils in the dramatic art. Thus the play *Henry the Eighth* is almost universally regarded as being written by Fletcher under Shakespeare's oversight, with some scenes by the older poet.

Between the writing of *Love's Labour's Lost* and of the play *Henry the Eighth* four periods can be clearly traced in Shakespeare, though they overlap to some extent. First there comes a set of plays that show light-hearted joyous youth, which expresses itself in the forms that were popular at the moment. The most characteristic piece is *Love's Labour's Lost*, a fanciful exercise that changes frequently from rhyme to prose and then to blank verse, and is full of the trickery of playing a kind of game with words.

HOW SHAKESPEARE WITH HIS WONDERFUL POWER PUTS PICTURES INTO VERSE

No one could foresee from such a play the greatness that was in Shakespeare. It is not till we reach the closing verses descriptive of winter that we recognize the wonderful picture-making power of the poet, and his gift of simple closely knit expression.

When icicles hang by the wall,
And Dick the shepherd blows his nail,
And Tom bears logs into the hall,
And milk comes frozen home in pail,
When blood is nipp'd and ways be foul,
Then nightly sings the staring owl:
Tu-whit, tu-who—a merry note,
While greasy Joan doth keel the pot.
When all aloud the wind doth blow,
And coughing drowns the parson's saw,
And birds sit brooding in the snow,
And Marian's nose looks red and raw,
When roasted crabs hiss in the bowl,
Then nightly sings the staring owl:
Tu-whit, tu-who—a merry note,
While greasy Joan doth keel the pot.

A perfect little picture of winter in England at that time. *Saw*, of course, means saying, *keel* means skim, and *crab* means crab-apple.

Other plays of the time were *The*

Comedy of Errors, in which the interest lies in the plot, and *Two Gentlemen of Verona*, which includes the first of the exquisite songs that adorn so many of Shakespeare's plays.

Who is Silvia? what is she?
That all our swains commend her?
Holy, fair, and wise is she;
The heaven such grace did lend her,
That she might admired be.
Is she kind as she is fair?
For beauty lives with kindness:
Love doth to her eyes repair,
To help him of his blindness;
And, being helped, inhabits there.
Then to Silvia let us sing,
That Silvia is excelling;
She excels each mortal thing
Upon the dull earth dwelling;
To her let us garlands bring.

PLAYS THAT REVEALED THE SWEETNESS OF SHAKESPEARE'S POETRY

The poetry that was in Shakespeare from the first shows itself in sentiment musically expressed in these early plays, written before he had attained his full strength of intellect. A tender example is this speech of Julia in the *Two Gentlemen of Verona*, when going on a pilgrimage of love.

The current that with gentle murmur glides,
Thou knowest, being stopped, impatiently
doth rage;
But when his fair course is not hindered,
He makes sweet music with the enamelled
stones,
Giving a gentle kiss to every sedge
He overtaketh in his pilgrimage;
And so by many winding nooks he strays
With willing sport, to the wild ocean.
Then let me go and hinder not my course:
I'll be as patient as a gentle stream
And make a pastime of each weary step,
Till the last step hath brought me to my love;
And there I'll rest, as after much turmoil
A blessed soul doth in Elysium.

THE PROUD NOTE OF PATRIOTISM THAT HAS SOUNDED THROUGH THE AGES

This period of youthful sweetness with growing strength covered the time when Shakespeare was writing his early published poems and probably some of his sonnets. It included also his early historical plays and his first passionate tragedy, *Romeo and Juliet*.

In his early historical plays he followed the lead of Christopher Marlowe, who had made blank verse seem the natural metre for heroic and tragic scenes. Probably he worked with Marlowe; certainly he was greatly impressed by Marlowe's full-toned, high-sounding strain, and closely imitated it, especially



Sir Edward Poynter's picture of Helena and Hermia in the garden—From *A Midsummer Night's Dream*.

in Richard the Third, the most exciting of his plays.

For the historical foundation of his plays Shakespeare had few books on which he could rely. Indeed, almost his only source was Holinshed's Chronicle, but he so used it that he made his characters live vividly before the eyes of all who saw or read his acted histories. Millions have found a thrilling interest in England's story through his presentation of it.

His love of England and his pride in her greatness struck a chord of patriotism that has resounded through the ages. First in point of time, though not perhaps in writing, is the proud boast with which the play of King John closes.

This England never did, nor never shall,
Lie at the proud foot of a conqueror,
But when it first did help to wound itself.
Come the three corners of the world in arms,
And we shall shock them. Nought shall
 make us rue,
If England to itself do rest but true.

And never, surely, was delight in all that England is to her children expressed with such passionate tenderness as in the speech given to John of Gaunt in King Richard the Second:

This royal throne of kings, this scepter'd isle,
This earth of majesty, this seat of Mars,
This other Eden, demi-paradise,
This fortress built by Nature for herself
Against infection and the hand of war,
This happy breed of men, this little world,
This precious stone set in the silver sea,

Which serves it in the office of a wall,
Or as a moat defensive to a house,
Against the envy of less happier lands,
This blessed plot, this earth, this realm, this
England,
This land of such dear souls, this dear, dear land,
Dear for her reputation through the world!

The same proud note was struck again
as firmly in the later play of Henry the
Fifth, when Shakespeare had passed out
of the period of enthusiastic youth.

The weaknesses of Shakespeare's
earliest period are perhaps most clearly
shown in his first tragedy, the passionate
love-story of Romeo and Juliet. Its in-
tensity of feeling has caused it to keep
its place on the stage, though when
calmly examined on its merits as a pic-
ture of real life, it has little to recom-
mend it, unless it is used as a warning
against the whirlwind feeling of youth.
From that stage he passed, about the
age of thirty, into a second period when
his genius developed on the lines of de-
lightful comedy, graceful poetical fancy,
and deeper reading of human character.

The plays of the period that show
these qualities most clearly are *The
Merchant of Venice*, *Midsummer Night's
Dream*, and *As You Like It*, while to
the same period belong the historical
plays, *Henry the Fourth*, with its richly
humorous relief in the character of Fal-
staff, and *Henry the Fifth*, where English
national feeling runs very high.

THE LAUGHTER THAT PLAYS ROUND A FANCIFUL USE OF WORDS

Falstaff is a reminder that nowhere in
English literature is there such an equal
commingling of humor and seriousness as
in Shakespeare, and the humor grew
with the seriousness. In his earlier
plays the poet was smart and witty, but
his laughter was that which plays round
a fanciful use of words. As his view of
life became graver the humor deepened,
and was used to display the strange con-
trasts in human character. At no moment
is humor far away, though often it raises
the laughter which merges into a sigh.

In *The Merchant of Venice* Shake-
speare's skill as a dramatist and student
of human character reached its full bal-
ance. It is a mixture of comedy and
tragedy. An undertone of sadness is
heard from first to last. It begins with
the merchant's misfortunes and is heard
throughout the scorning of the Jew Shy-
lock. That tone was never again to
leave Shakespeare's work entirely.

In *The Merchant of Venice* the richness
of the poet's vein of pure poetry, already
seen in his sonnets, was brought into his
plays in fuller measure. He has begun
to decorate his scenes with passages of
sheer beauty, as in Lorenzo's enjoyment
of the night, with music stealing in.

How sweet the moonlight sleeps upon this
bank!

Here will we sit, and let the sounds of music
Creep in our ears; soft stillness and the night
Become the touches of sweet harmony.
Sit, Jessica; look, how the floor of heaven
Is thick inlaid with patines of bright gold:
There's not the smallest orb which thou be-
holdest

But in his motion like an angel sings,
Still quiring to the young-eyed cherubins:
Such harmony is in immortal souls;
But, whilst this muddy vesture of decay
Doth grossly close it in, we cannot hear it.

SHAKESPEARE'S STUDY OF CHARACTER AND HIS SPLENDID SPEECH OF MERCY

Now, too, the poet's study of human
character is more understanding and
complete, as in his picture of the effects
of persecution on the Jewish people,
seen in *Shylock*. At the same time his
thought is more closely knit and its ex-
pression perfected, as in the fine discourse
on mercy in the trial scene.

The quality of mercy is not strained;
It droppeth as the gentle rain from heaven
Upon the place beneath; it is twice blessed;
It blessing him that gives and him that takes:
'Tis mightiest in the mightiest; it becomes
The throned monarch better than his crown;
His sceptre shows the force of temporal power,
The attribute to awe and majesty,
Wherein doth sit the dread and fear of kings;
But mercy is above this sceptred sway,
It is enthroned in the hearts of kings,
It is an attribute to God Himself;
And earthly power doth then show likest God's
When mercy seasons justice. Therefore, Jew,
Though justice be thy plea, consider this,
That in the course of justice none of us
Should see salvation: we do pray for mercy,
And that same prayer should teach us all to
render
The deeds of mercy.

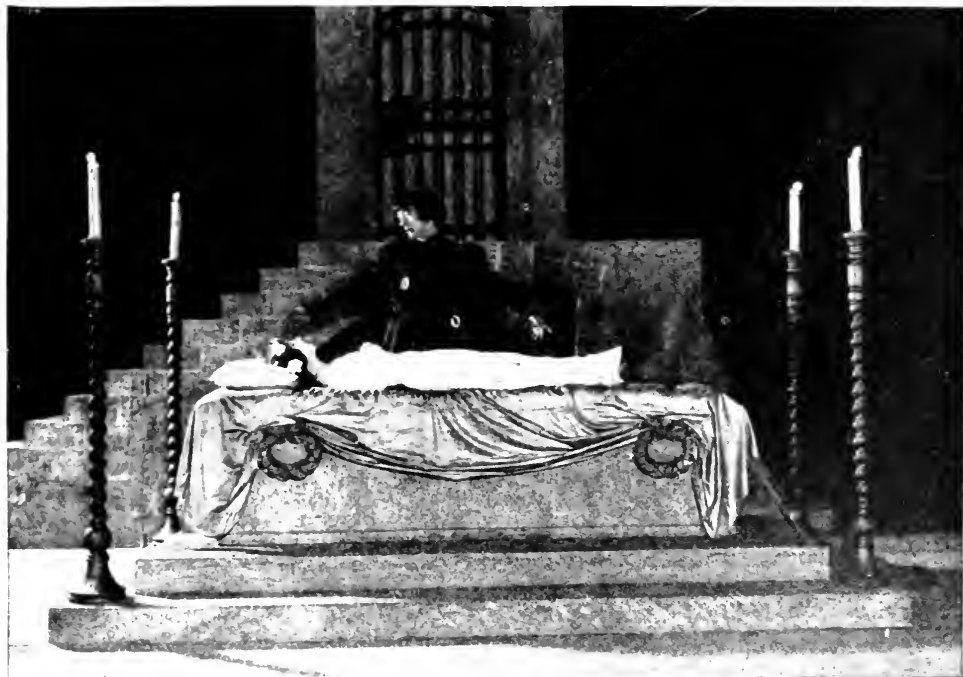
THE LULLABY THE FAIRIES SANG WHILE THEY WATCHED OVER TITANIA

A most delightful side of Shakespeare's
genius was his power of surrendering
himself to the sweetness of fancy as it
visits us all when young. That this
happy playfulness was native to the man
is shown by the fact that not only did
he indulge it in his *Midsummer Night's
Dream*, when his mind was strengthening
into full manhood, but he again gave it
free play in *The Tempest*, written in his

SHAKESPEARE'S MOST BEAUTIFUL LOVE STORY



At the feast of the Capulets, Romeo, a Montague, sees Juliet and loves her at sight. He waits to salute her hand, and the brief interview is sufficient to awaken all Juliet's interest in him. In this picture her father and Romeo are watching her greeting of Paris.



The brief, unhappy, beautiful tale is done. Romeo, banished for killing Tybalt, hears that Juliet is dead. He hastens back to Verona and, finding her apparently dead in her tomb, drinks poison. A moment later Juliet awakes from deep sleep. Friar Lawrence and she had arranged a desperate plan to avert her marriage to Paris. By accident Friar Lawrence's letter to Romeo was delayed, and thus tragedy befell.

Pictures on pages 832, 837 by permission of Miss Jane Cowl.

later years. By the gladsome play of his dainty fancy Shakespeare is the poet of our childhood as much as he is the poet of manhood and womanhood in all their moods.

Hear the lullaby of the fairies as Titania, their queen, sleeps while they watch.

You spotted snakes, with double tongue,
Thorny hedgehogs, be not seen;
Newts and blindworms, do no wrong;
Come not near our fairy queen.
Weaving spiders, come not here;
Hence, you long-legged spinners, hence!
Beetles black, approach not near;
Worm nor snail, do no offence.
Philomel, with melody,
Sing in our sweet lullaby;
Lulla, lulla, lullaby; lulla, lulla, lullaby:
Never harm,
Nor spell, nor charm,
Come our lovely lady nigh;
So, good-night, with lullaby.

It is the very voice of Fairyland; and Shakespeare can recapture it at will. Of course we think differently of these lowly creatures now. Most of them do very little harm and much good, but they were once feared and the feeling still persists here and there, though we do not think nowadays that the fairies will guard us against them, as once they guarded Titania.

THE COMEDY THAT STANDS AS THE MOST CHARMING THAT SHAKESPEARE WROTE

The open-air comedy of *As You Like It* in its lighter moments remains the most charming that Shakespeare ever wrote. Its prevailing tone is heard in the song:

Under the greenwood tree,
Who loves to lie with me,
And tune his merry note
Unto the sweet bird's throat,
Come hither, come hither, come hither:
Here shall he see,
No enemy
But winter and rough weather.
Who doth ambition shun,
And loves to live i' the sun,
Seeking the food he eats,
And pleased with what he gets,
Come hither, come hither, come hither:
Here shall he see
No enemy
But winter and rough weather.

THE POET AND PHILOSOPHER WHO UNDERSTOOD THE INMOST SOUL OF MAN

Yet still, even here, the stress of life is not altogether kept out while the woodland company is singing "This life is most jolly." The mention of the weather introduces that most feeling strain that tells how the poet's spirit had

been sobered and chastened by personal cares of which we know but little.

Blow, blow, thou winter wind,
Thou art not so unkind
As man's ingratitude;
Thy tooth is not so keen,
Because thou art not seen,
Although thy breath be rude.
Freeze, freeze, thou bitter sky,
Thou dost not bite so nigh
As benefits forgot.
Though thou the waters warp,
Thy sting is not so sharp
As friend remembered not.

And again, into the midst of the gay-souled company, "fleeting the time carelessly as in the golden world," the melancholy Jacques brings the note of sadness, as he reminds them all, through his brief, yet full, sketch of the Seven Ages of Man, of the slow march of relentless time.

All the world's a stage,
And all the men and women merely players:
They have their exits and their entrances;
And one man in his time plays many parts.
His acts being seven ages. At first the infant,
Mewling and puking in the nurse's arms.
And then the whining schoolboy, with his satchel

And shining morning face, creeping like snail
Unwillingly to school. And then the lover,
Sighing like furnace, with a woful ballad
Made to his mistress' eyebrow. Then a soldier,
Full of strange oaths, and bearded like the

pard,
Jealous in honour, sudden and quick in quarrel,
Seeking the bubble reputation
Even in the cannon's mouth; and then the justice,

In fair round belly with good capon lined,
With eyes severe, and beard of formal cut,
Full of wise saws and modern instances;
And so he plays his part. The sixth age

shifts
Into the lean and slippered pantaloen,
With spectacles on nose and pouch on side,
His youthful hose well saved, a world too wide

For his shrunk shank; and his big manly voice,
Turning again toward childish treble, pipes
And whistles in his sound. Last scene of all,
That ends this strange eventful history,
Is second childishness and mere oblivion,
Sans teeth, sans eyes, sans taste, sans every-thing.

The obsolete *pard* means leopard; *capon*, a chicken; *sans*, without.

We have in this sketch a full illustration of the serious mood that was settling on Shakespeare. It drew from him deep thoughts that have added to his fame as the first among the singing poets and the large-hearted humorists. It gave him the crowning glory of being a profound philosopher.

THE NEXT STORY OF LITERATURE IS ON PAGE 983.

AS YOU LIKE IT



This scene from *As You Like It* is from the painting by Harold Speed. After the wrestling match, Rosalind, the exiled Duke's daughter, gave the victor a chain. Celia, the usurping Duke's daughter, loved her cousin very much and decided to fly with her when Rosalind was turned out of her uncle's house.



Together with the faithful fool Touchstone, Rosalind and Celia left the Duke's mansion and soon arrived in the Forest of Arden. The better to protect her cousin and further her plan for finding her father, Rosalind adopted the dress of a shepherd youth. This scene is from a painting by Sir John E. Millais.

TWO BEAUTIFUL HEROINES



Beautiful Ophelia, the daughter of a courtier Polonius, fell in love with Hamlet, Prince of Denmark. At first he loved her, but the determination to avenge his father's murder caused him to feign madness, and led him also to spurn Ophelia. The shock was too great for the sensitive girl. She wandered through the palace scattering flowers and singing little songs, and finally was found drowned in a brook.



Here we see the lovely Desdemona with her father, Brabantio, and her lover, the brave Moor. She thought more of Othello's noble mind than of his dark skin, and all her delight was to listen to his tales of the wars in which he had fought, of his hairbreadth escapes, his adventures by land and sea

SIR JOHN FALSTAFF, SOLDIER OF FORTUNE



Sir John Falstaff was made by Shakespeare into a cowardly and boastful character. In the play of Henry IV he is the friend of young Prince Hal, and his boon companion in all his wild escapades. Prince Henry's father tried to separate the two friends, for he hated the older man's bad influence, but in vain. In the early scenes of Henry V he dies in neglect and want. Falstaff is not exactly a villain, for he does not plot against any man's life or character, though he will, if occasion offer, take his purse. He is a soldier by profession, and this picture shows him reviewing his new troops.



In the play of The Merry Wives of Windsor, Falstaff, in order to obtain money for himself and rude companions, makes love to two women at once. They are friends and show one another the letters each has received. To punish Sir John they proceed to play tricks upon him. The "merry wives" here are played by Ellen Terry and Mrs. Kendall; Sir John, by Beerbohm Tree.

Photo. Mansell.

GOOD KING WENCESLAS WENT FORTH



PAGE AND MONARCH FORTH THEY WENT, FORTH THEY WENT TOGETHER,
THROUGH THE RUDE WIND'S WILD LAMENT, AND THE BITTER WEATHER
From the painting by Sheridan Knowles.



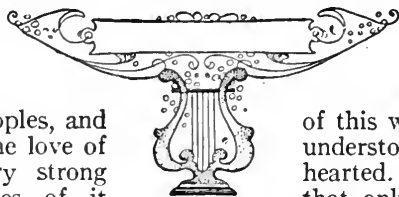
THE POETS AND CHILDHOOD

THE love of mother and father for their little ones is seen in the poetry of different peoples, and in our own country the love of little children is very strong and we see evidences of it everywhere about us. In every land it is one of the things that help to make a country great and powerful. In China little girls are despised by their parents, and used to be killed because their parents thought they had no use for them. But in near-by island Japan little children have always been loved as much as in our own land.

As we read the famous poets, we shall find that few indeed have not written poems for or about the little children. "Suffer the little children to come unto me," said Jesus, and our poets seem always since then to have regarded childhood as something sacred because Jesus first sanctified the love of children.

Big books might be made up of the poems on childhood. In our own Book of Poetry a very large number of poems are about children. We have seen how such great poets as Longfellow and Tennyson and Browning loved to turn from the graver subjects to write for children. But we have also seen that a vast amount of general poetry written not specially for young people can come into a child's book of poetry. There is a reason for this, and we will see if it can be made quite clear.

As a great thinker has wisely said, true genius is nothing more than the power to be children again at will. The genius is really a man whose head has grown old, but whose heart, like Peter Pan, has not "grown up."



He remains in advanced years, young in heart. Now, all the beautiful things of this world are seen best and understood best by the simple-hearted. Did not Jesus say that only "the pure in heart" shall see God? Nay, more. He said, "Except ye be converted, and become as little children, ye shall not enter into the kingdom of heaven."

This really means that grown-up people must go back to the simple faith and pure-heartedness of childhood. What a fine thought is here for all young people! The whole glory of the world is with the young, because they have simple hearts. So is it with most of our great poets. Tennyson and Longfellow, being men of genius, had this power to "convert" themselves into little children at will; with all the buffeting of life's daily battle, all the trials of faith which must be met by each one of us, their simplicity of heart remained.

This really explains why so much of our poetry is suitable for boys and girls, and also why so much good poetry has been written by our lesser poets especially for children. This splendid inheritance of the poetry of childhood is something of which all our boys and our girls have good reason to be proud.

Another thing is indicated by what we have just said—that while a great amount of our poetry has been written for boys and girls, there is no reason why that should be the only class of poetry they should read. Boys and girls may read all that is best in poetry just as well as their mothers and fathers can read it.

GOOD KING WENCESLAS

All over the world where carols are sung in the English tongue this carol of Good King Wenceslas is sung at Christmas-time; but the lesson it teaches of a king's humility is appropriate at all times, for people as well as for kings, and we cannot learn this lesson too well.

GOOD King Wenceslas looked out
On the feast of Stephen,
When the snow lay round about,
Deep and crisp and even.
Brightly shone the moon that night,
Tho' the frost was cruel;
When a poor man came in sight,
Gathering winter fuel.

"Hither, page, and stand by me,
If thou know'st it telling—
Yonder peasant, who is he,
Where, and what, his dwelling?"
"Sire, he lives a good league hence,
Underneath the mountain,
Right against the forest fence
By Saint Agnes fountain."

"Bring me flesh and bring me wine,
Bring me pine-logs hither;
Thou and I will see him dine,
When we bear them thither."
Page and monarch forth they went,
Forth they went together,
Thro' the rude wind's wild lament,
And the bitter weather.

"Sire, the night is darker now,
And the wind blows stronger;
Fails my heart I know not how—
I can go no longer."
"Mark my footsteps, good my page,
Tread thou in them boldly;
Thou shalt find the winter's rage
Freeze thy blood less coldly."

In his master's steps he trod,
Where the snow lay dotted.
Heat was in the very sod
Which the saint had printed.
Therefore, Christian men, be sure,
Wealth or rank possessing,
Ye who now will bless the poor
Shall yourselves find blessing.

THE GREEDY BOY

In the early years of last century Mrs. Elizabeth Turner wrote *The Daisy*, and other books named after flowers, for children. They were quaint little books of prose and verse, and the following lines are taken from one of them.

SAMMY SMITH would drink and eat
From morning unto night;
He filled his mouth so full of meat,
It was a shameful sight.

Sometimes he gave a book or toy
For apples, cake, or plum;
And grudged if any other boy
Should taste a single crumb.

Indeed, he ate and drank so fast,
And used to stuff and cram,
The name they called him by at last
Was often Greedy Sam.

THE YOUNG MOUSE

This has been a children's favorite for eighty years or more. It was written by Jeffreys Taylor, a brother of Jane and Ann Taylor, who wrote so many well-known children's poems, and it deservedly ranks high among the verses of its kind.

IN a crack near a cupboard, with dainties
provided,
A certain young mouse with her mother re-
sided;
So securely they lived on that fortunate
spot,
Any mouse in the land might have envied
their lot.

But one day this young mouse, who was given
to roam,
Having made an excursion some way from
her home,
On a sudden return'd, with such joy in her
eyes
That her grey sedate parent express'd some
surprise.

"O mother!" said she, "the good folks of
this house,
I'm convinced, have not any ill-will to a
mouse;
And those tales can't be true which you
always are telling,
For they've been at the pains to construct us
a dwelling.

"The floor is of wood, and the walls are of
wires,
Exactly the size that one's comfort requires;
And I'm sure that we should there have
nothing to fear,
If ten cats with their kittens at once should
appear.

"And then they have made such nice holes in
the wall,
One could slip in and out with no trouble
at all;
But forcing one through such crannies as
these
Always gives one's poor ribs a most terrible
squeeze.

"But the best of all is, they've provided us
well,
With a large piece of cheese of most exqui-
site smell;
'Twas so nice, I had put my head in to go
through,
When I thought it my duty to come and
fetch you."

"Ah child!" said her mother, "believe, I
entreat,
Both the cage and the cheese are a horrible
cheat.
Do not think all that trouble they took for
our good;
They would catch us and kill us all there if
they could,
As they've caught and kill'd scores; and I
never could learn
That a mouse, who once enter'd, did ever
return!"

Let the young people mind what the old
people say
And when danger is near them keep out of
the way.



I REMEMBER, I REMEMBER

In this famous poem by Thomas Hood the author seeks to endear to us the pure joys of childhood, the happiest years of all. Memory is the friend of old people, for it enables them to recall the happy days of long ago, days which now exist for all boys and girls. There is a tone of sadness in Hood's poem, as he knew sorrow and much ill-health when he was a man. A happy, healthy childhood is the most lasting of all the joys on earth, something worth remembering.

I REMEMBER, I remember

The house where I was born,
The little window, where the sun
Came peeping in at morn;
He never came a wink too soon,
Nor brought too long a day;
But now I often wish the night
Had borne my breath away!

I remember, I remember

The roses, red and white,
The violets and the lily-cups,
Those flowers made of light!
The lilacs where the robin built,
And where my brother set
The laburnum on his birthday
The tree is living yet!

I remember, I remember

Where I was used to swing,
And thought the air must rush as fresh
To swallows on the wing.
My spirit flew in feathers then,
That is so heavy now;
And summer pools could hardly cool
The fever on my brow!

I remember, I remember

The fir trees, dark and high;
I used to think their slender tops
Were close against the sky:
It was a childish ignorance,
But now 'tis little joy
To know I'm farther off from Heaven
Than when I was a boy.

THE HOMES OF ENGLAND

Mrs. Hemans was a favorite poet in the days of our grandfathers. She died in 1835. Though not a great writer, yet she composed many beautiful poems, which will not soon be forgotten, as her words were sweet and her thoughts were full of kindness and love. This delightful poem presents the verdant charm, beauty and variety of the homes of England.

THE stately homes of England!

How beautiful they stand,
Amidst their tall ancestral trees,
O'er all the pleasant land!
The deer across their greensward bound,
Through shade and sunny gleam;
And the swan glides past them with the sound
Of some rejected stream.

The merry homes of England!

Around their hearths by night,
What gladsome looks of household love
Meet in their ruddy light!
There woman's voice flows forth in song,
Or childish tale is told,
Or lips move tunelessly along
Some glorious page of old.

The blessed homes of England!

How softly on their bowers
Is laid the holy quietness
That breathes from Sabbath hours!
Solemn, yet sweet, the church-bell's chime
Floats through their woods at morn;
All other sounds, in that still time,
Of breeze and leaf are born.

The cottage homes of England!

By thousands on her plains,
They are smiling o'er the silvery brooks,
And round the hamlet's fanes.
Through glowing orchards forth they peep,
Each from its nook of leaves;
And fearless there the lowly sleep,
As the birds beneath their eaves.

The free, fair homes of England!
Long, long, in hut and hall,
May hearts of native proof be reared
To guard each hallowed wall!
And green for ever be the groves,
And bright the flowery sod,
When first the child's glad spirit loves
Its country and its God!

THE FATHERLAND

While it is right that we should be proud of our native land, it is also right that we should not admire anything which is not noble and true, even if it is found in our native land. The true "fatherland" means any country, anywhere, that can show deeds of mercy, justice and brotherly love. That is what James Russell Lowell, the famous American poet, who wrote this poem, wants us to feel. In a word, we have to admire these grand qualities wherever we find them, whether it be in America or in any other country in the world.

WHERE is the true man's fatherland?

Is it where he by chance is born?

Doth not the yearning spirit scorn
In such scant borders to be spanned?
Oh yes! his fatherland must be
As the blue heaven, wide and free!

Is it alone where freedom is,
Where God is God and man is man?
Doth he not claim a broader span
For the soul's love of home than this?
Oh yes! his fatherland must be
As the blue heaven, wide and free!

Where'er a human heart doth wear
Joy's myrtle-wreath or sorrow's gyves,
Where'er a human spirit strives
After a life more true and fair,
There is the true man's birthplace grand,
His is the world-wide fatherland!

Where'er a single slave doth pine,
Where'er one man may help another—
Thank God for such a birthright, brother—
That spot of earth is thine and mine!
There is the true man's birthplace grand,
His is a world-wide fatherland!

WISH

Samuel Rogers, who died in 1855, was a wealthy banker and the friend of many poets and literary men. He wrote a good deal of poetry, but not of a very high order. A Wish is a pretty little poem in praise of the simple country life, and it is interesting to know that its author lived in a splendid mansion all his life. How true it is that we most admire those things which we have not got!

MINE be a cot beside a hill;

A beehive's hum shall soothe my ear;
A willowy brook that turns a mill
With many a fall shall linger near.

The swallow, oft, beneath my thatch,
Shall twitter from her clay-built nest;
Oft shall the pilgrim lift the latch,
And share my meal, a welcome guest.

Around my ivied porch shall spring,
Each fragrant flower that drinks the dew;
And Lucy, at her wheel, shall sing
In russet gown and apron blue.

The village church among the trees,
Where first our marriage vows were given,
With merry peals shall swell the breeze
And point with taper spire to heaven.

THE SHIP OF STATE

The Constitution and Laws of the land are here personified and addressed in lofty verse as the "Ship of State," by the widely loved household poet Henry Wadsworth Longfellow.

SAIL on, sail on, O Ship of State!

Sail on, O Union, strong and great!
Humanity, with all its fears,
With all the hopes of future years,
Is hanging breathless on thy fate!
We know what Master laid thy keel,
What Workmen wrought thy ribs of steel,
Who made each mast, and sail, and rope,
What anvils rang, what hammers beat,
In what a forge and what a heat
Were shaped the anchors of thy hope!
Fear not each sudden sound and shock—
'Tis of the wave, and not the rock;
'Tis but the flapping of the sail,
And not a rent made by the gale!
In spite of rock and tempest roar,
In spite of false lights on the shore,
Sail on, nor fear to breast the sea!
Our hearts, our hopes, are all with thee.
Our hearts, our hopes, our prayers, our tears,
Our faith, triumphant o'er our fears,
Are all with thee, are all with thee!



THE MOUNTAIN AND THE
SQUIRREL

Emerson was a famous American writer and thinker. He was seldom humorous in his poems, but this is one of the exceptions. Though the verse is humorous, its lesson is quite serious, for it reminds us that we have each our particular work to do and our special abilities for doing it. The all-wise Creator has not made us all alike, each of us has different talents, and we must do our best with the gifts He has given us.

THE mountain and the squirrel

Had a quarrel,
And the former called the latter "Little
prig";
Bun replied,
"You are doubtless very big;
But all sorts of things and weather
Must be taken in together
To make up a year.
And a sphere.
And I think it no disgrace
To occupy my place.
If I'm not so large as you,
You are not so small as I,
And not half so spry:
I'll not deny you make
A very pretty squirrel track.
Talents differ; all is well and wisely put;
If I cannot carry forests on my back,
Neither can you crack a nut."

NURSE'S SONG

William Blake proves in this little song how closely he must have observed the things he sings about so clearly. Notice the sixth line of the first verse, and look at what we have said in the note to Wordsworth's *Pet Lamb* on page 2031.

WHEN the voices of children are heard on the green,
And laughing is heard on the hill,
My heart is at rest within my breast,
And everything else is still.
Then come home, my children, the sun is gone down,
And the dews of night arise;
Come, come, leave off play, and let us away
Till the morning appears in the skies.
"No, no, let us play, for it is yet day,
And we cannot go to sleep;
Besides, in the sky the little birds fly,
And the hills are all covered with sheep."
Well, well, go and play till the light fades away,
And then go home to bed.—
The little ones leap'd, and shouted, and laugh'd;
And all the hills echoed.

THE WORM

In the simplicity of the following little piece there is the very essence of Christian teaching, the poet who wrote it being famous as a philosopher and preacher. His name was Thomas Gisborne, and he was born in 1753 and died in 1846.

TURN, turn thy hasty foot aside,
Nor crush that helpless worm!
The frame thy wayward looks deride
Required a God to form.
The common lord of all that move,
From whom thy being flow'd,
A portion of His boundless love
On that poor worm bestow'd.
The sun, the moon, the stars, He made
For all His creatures free;
And spread o'er earth the grassy blade,
For worms as well as thee.
Let them enjoy their little day,
Their humble bliss receive;
O! do not lightly take away
The life thou canst not give!

JOCK OF HAZELDEAN

This ballad by Sir Walter Scott has long been one of the most popular in Scotland, and tells of a country lass who preferred to run away with a poor man whom she loved, and to marry him rather than the rich bridegroom chosen for her. It contains many Scotch words, but they are easy to understand.

"WHY weep ye by the tide, ladie?
Why weep ye by the tide?
I'll wed ye to my youngest son,
And ye sall be his bride:
And ye sall be his bride, ladie,
Sae comely to be seen"—
But aye she loot the tears down fa'
For Jock of Hazeldean.
"Now let this wilfu' grief be done,
And dry that cheek so pale;
Young Frank is chief of Errington,
And lord of Langley-dale;
His step is first in peaceful ha',
His sword in battle keen"—
But aye she loot the tears down fa'
For Jock of Hazeldean.

"A chain of gold ye sall not lack,
Nor braid to bind your hair,
Nor mettled hound, nor managed hawk,
Nor palfrey fresh and fair;
And you the foremost o' them a'
Sall ride our forest-queen"—
But aye she loot the tears down fa'
For Jock of Hazeldean.
The kirk was deck'd at morning-tide,
The tapers glimmer'd fair;
The priest and bridegroom wait the bride,
And dame and knight are there:
They sought her baith by bower and ha';
The ladie was not seen!
She's o'er the Border, and awa'
Wi' Jock of Hazeldean.

THE ARMING OF PIGWIGGEN

Michael Drayton was one of the many poets who lived in the time of Queen Elizabeth. He wrote beautiful descriptions of English scenery and country life. One of his most remarkable works was a description of *The Court of Fairy*, full of fancy and imagination. Pigwiggan was a fairy who was in love with Queen Mab, and in the following verses from Drayton's long poem the arming of Pigwiggan is described.

HE quickly arms him for the field—
A little cockle-shell his shield,
Which he could very bravely wield,
Yet could it not be piercèd;
His spear a bent both stiff and strong,
And well near of two inches long;
The pile was of a horse-fly's tongue,
Whose sharpness naught reversed.
And put him on a coat of mail,
Which was of a fish's scale,
That when his foe should him assail,
No point should be prevailing.
His rapier was a hornet's sting,
It was a very dangerous thing;
For if he chanced to hurt the king,
It would be long in healing.
His helmet was a beetle's head,
Most horrible and full of dread,
That able was to strike one dead,
Yet it did well become him;
And for a plume a horse's hair,
Which, being tossed up by the air,
Had force to strike his foe with fear,
And turn his weapon from him.
Himself he on an earwig set,
Yet scarce he on his back could get,
So oft and high he did curvet
Ere he himself could settle:
He made him turn, and stop, and bound,
To gallop and to trot the round,
He scarce could stand on any ground,
He was so full of mettle.

TRUE GROWTH

There is much wisdom compressed into these ten short lines of verse by the great Elizabethan poet Ben Jonson. The last line but one might be applied to the little poem itself.

IT is not growing like a tree
In bulk, doth make Man better be;
Or standing long an oak, three hundred year,
To fall a log at last, dry, bald, and sere:
A lily of a day
Is fairer far in May,
Although it fall and die that night—
It was the plant and flower of Light!
In small proportions we just beauties see
And in short measures life may perfect be.

A CRADLE SONG

As we see on page 1009, so great a poet as Lord Tennyson could devote his genius to the writing of a sweet little song for mothers to sing by baby's cradle. Here is another from his pen, pure and simple as baby itself. We should always bear in mind that a true poet does not despise the little things although he is able to write of the great ones.

WHAT does little birdie say
In her nest at peep of day?
Let me fly, says little birdie,
Mother, let me fly away.
Birdie, rest a little longer,
Till the little wings are stronger.
So she rests a little longer,
Then she flies away.

What does little baby say
In her bed at peep of day?
Baby says, like little birdie,
Let me rise and fly away.
Baby, sleep a little longer,
Till the little limbs are stronger,
If she sleeps a little longer,
Baby too shall fly away.

THE TERRIBLE BALL*

Mary Mapes Dodge is a clever American writer of children's stories and poems. This is one of her humorous story-poems, which behind its fun has a lesson for us in reminding us that a little mischief may grow bigger than was originally intended, and may ultimately get beyond our control.

GIVE me your ear, good children all,
I'm going to set up a terrible ball—
A terrible ball that began to grow
From only the least little speck of snow.
And, to make the lesson pointed and plain,
I'll just remark that life, in the main,
Is, et cetera—you know; and I hope you'll be
good
In future to show that you've understood.

Three lovely, little artless boys,
All of them being mother's joys,
One day decided, in innocent mirth,
To make a snowball as big as the earth.
What makes the story more touching still,
The big-eyed schoolhouse on the hill
Was in session, under the cross Miss Stookey,
And these little boys were "playing hookey."
Hookey from Stookey, they worked with a
will,

The ball grew bigger—and bigger still.

Then, like a pumpkin fair and round,
They kept it rolling on the ground—
Bigger, bigger, bigger, bigger,
Bigger, bigger, bigger, bigger!
The boys could hardly push it along,
It steadily grew so stout and strong.

Now, this mammoth ball, that began as a pill,
Was made, you must know, on top of a hill;
This hill was so terribly steep and high,
That even the coasters would pass it by;
And, saving a road by the cattle made,
It sloped right down, at a fearful grade,
To the meadow, where stood a cottage red
Where these little children were born and bred.

"Halloo!" they cried, "let's have some fun,
There's Stookey's pig as sure as a gun!"

*From Rhymes and Jingles, copyright, 1874, 1904, by Charles Scribner's Sons. By permission of the publishers.

"Hooray! hooray!" cried the children three,
Thus giving vent to their youthful glee.
When—what do you think?—this ungrateful pill,

That they'd made so big on top of the hill,
With an air that said, "Now, I think I've
got 'em!"

Resolved to roll all the way to the bottom.

The ball was swift, the ball was big,
Alas for Stookey's innocent pig!
Alas for lovers who walked that way,
They ne'er in their lives forgot the day!
Alas for the learned Professor Gath,
Who happened to stroll in the snowball's path!
And alas, alas, for those children three,
Who shouted and cheered in their pretty glee!

Rolling, growing, demolishing all,
On and on went the terrible ball;
It left the cattle down on their knees,
It crushed the fences and bent the trees;
Even the haystacks went ker-hop.
It wouldn't turn, and it wouldn't stop,
But still rolled on in steady motion,
Making a bee-line for the ocean!

With laugh and shout and merry hoot,
Those children followed in glad pursuit.
"Hooray! hooray!" they cried again,
And then gave chase with might and main;
They gave it chase with main and might,
But the terrible ball rolled out of sight.

And now comes the saddest part of all.
(Oh, that cruel, wicked, terrible ball!)
When at last the three little artless boys,
Tired of running and making a noise,
All resolved to go home to bed,
Where, oh! where was that cottage red?
Where, oh! where? As the terrible ball—
Never a home had those children small.
Gone, clean gone! with picket and paling—
And all their joy was turned to wailing!

Moral

Hence it is, and so we see
Thus and so, it seems to me,
As I'm sure you'll all agree,
And ever after, better be.

SLEEP, BEAUTY BRIGHT

William Blake, the strange and mystic poet, as we have seen, could write simple lays of country life, and here we have him crooning a pretty little cradle song tender as a mother's, except that in the last lines he has a sudden fear for the dangers of life which the child, as it grows older, will have to face.

SLEEP, sleep, beauty bright.
Dreaming in the joys of night;
Sleep, sleep; in thy sleep
Little sorrows sit and weep.

Sweet babe, in thy face
Soft desires I can trace.
Secret joys and secret smiles,
Little pretty infant wiles.

As thy softest limbs I feel,
Smiles as of the morning steal
O'er thy cheek, and o'er thy breast
Where thy little heart doth rest.

Oh, the cunning wiles that creep
In thy little heart asleep!
When thy little heart doth wake,
Then the dreadful light shall break.

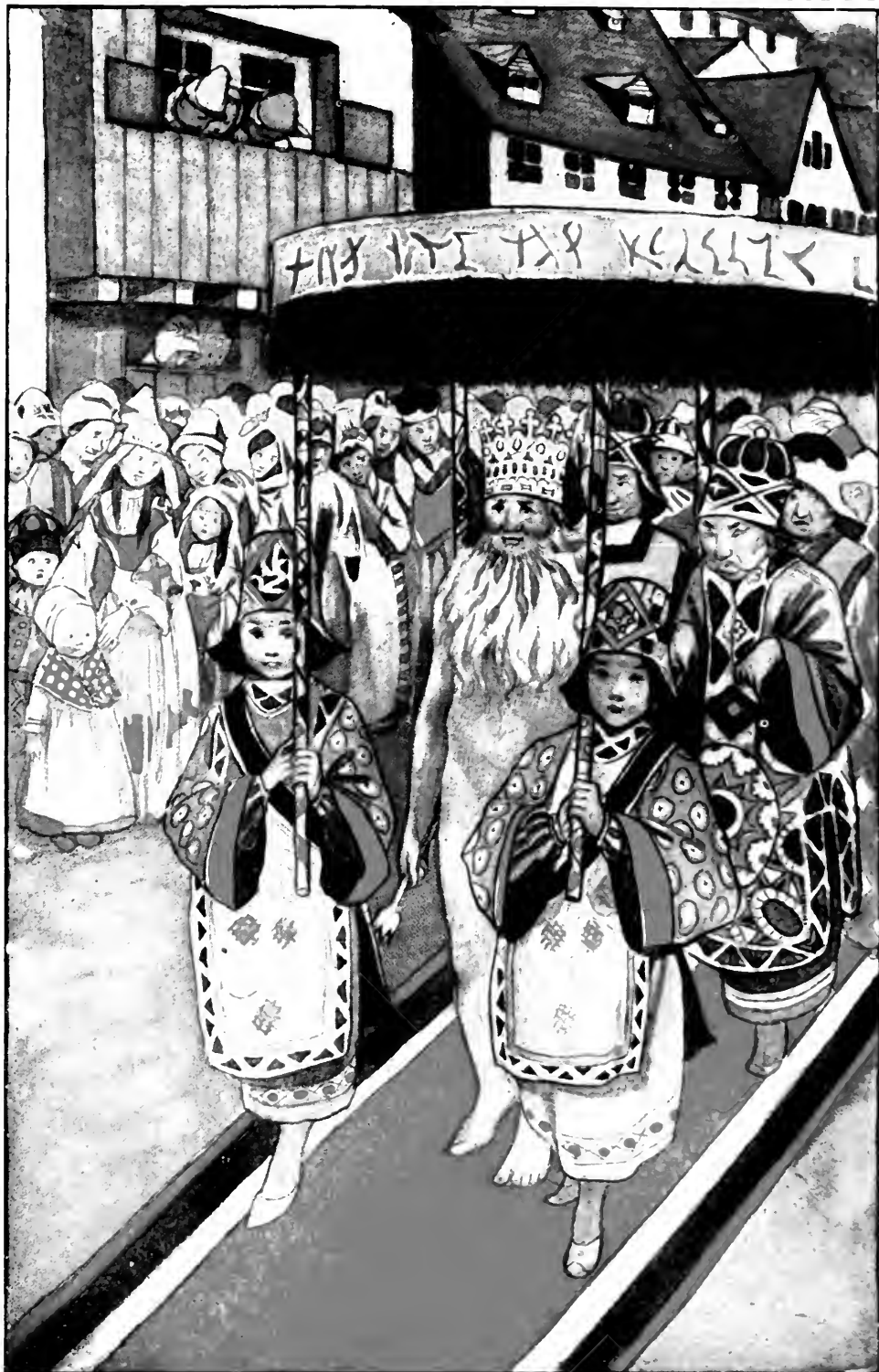


TRIP UPON TRENDIES

Trip upon trendies, and dance upon dishes,
 My mother sent me for some barm, some
 barm;
 She bid me tread lightly, and come again
 quickly,
 For fear the young men should do me some
 harm.
 Yet didn't you see, yet didn't you see,
 What naughty tricks they put upon me?
 They broke my pitcher, and knocked me
 down,
 And huffed my mother, and tore my gown,
 And kissed my sister instead of me!

BY S. L. SCOTT PALEY

THE EMPEROR WALKED IN THE PROCESSION



The emperor walked under his high canopy in the midst of the procession, and all the people cried out: "Oh, how beautiful are the emperor's new clothes!" "But the emperor has nothing on!" said a little child.



THE EMPEROR'S NEW CLOTHES

MANY years ago there was an emperor who was so fond of new clothes that he spent all his money in dress. He did not trouble in the least about his soldiers; nor did he care to go either to the theatre or the chase, except that they gave him opportunities for displaying his new clothes. He had a different suit for each hour of the day; and instead of saying of him: "He is sitting in council," people always said: "The emperor is sitting in his wardrobe."

Time passed away merrily in the large town which was his capital; strangers arrived every day at the court. One day two rogues, calling themselves weavers, made their appearance. They announced that they knew how to weave stuffs of the most beautiful colors and elaborate patterns, the clothes manufactured from which should have the wonderful power of remaining invisible to everyone who was unfit for the office he held, or who was extraordinarily simple in mind.

"These must indeed be splendid clothes!" thought the emperor. "Had I such a suit, I might at once find out what men in my realm are unfit for their office, and also be able to distinguish the wise from the foolish. This stuff must be woven for me immediately." And he ordered large

CONTINUED FROM 759



sums of money to be given to both the weavers, so that they might begin their work directly. So the two pretended weavers set up two looms, and appeared to work very busily, though in reality they did nothing at all. They asked for the most delicate silk and the purest gold thread, put both into their own knapsacks, and then continued their imaginary work at the empty looms until late at night.

"I should like to know how the weavers are getting on with my cloth," said the emperor to himself, after some little time had elapsed. He was, however, rather embarrassed, when he remembered that a simpleton, or one unfit for his office, would be unable to see the manufacture. "To be sure," he thought, "I have nothing to risk in my own person; but yet I would prefer sending somebody else to bring me news about the weavers and their work, before I trouble myself in the affair."

All the people throughout the city had heard of the wonderful power the cloth was to possess; and all were anxious to learn how wise, or how ignorant, their neighbors might prove to be.

"I will send my faithful old minister to the weavers," said the emperor at last; "he will be best able to see how the cloth looks; for he is a very

sensible man, and no one can be more suitable for his office than he is."

So the faithful old minister went into the hall, where the knaves were apparently working with all their might at their empty looms.

"What can be the meaning of this?" thought the old man, opening his eyes very wide. "I cannot discover the least bit of thread on the looms!"

However, he did not express his thoughts aloud.

The impostors requested him to be so good as to come nearer their looms, and then asked him whether the design pleased him, and whether the colors were not very beautiful, at the same time pointing to the empty frames. The poor old minister looked and looked, but he could not discover anything on the looms, for a very good reason—there was nothing there.

"What!" thought he again, "is it possible that I am a simpleton? I have never thought so myself; and, at any rate if I am so, no one must know it. Can it be that I am unfit for my office? No, that must not be said either. I shall never confess that I could not see the stuff."

"Well, sir minister," said one of the knaves, still pretending to work, "you do not say whether the stuff pleases you."

"Oh, it is admirable!" replied the old minister, looking at the loom through his spectacles. "This pattern, and the colors—I will tell the emperor how very beautiful I think them."

"We shall be much obliged to you," said the impostors; and then they named the different colors and described the patterns of the pretended stuff. Then the knaves asked for more silk and gold, saying that it was necessary to complete what they had begun. They eagerly took all the expensive materials given them, and hid the goods in their knapsacks, and continued to work with as much apparent diligence as before at their empty looms.

The emperor now sent another officer of his court to see how the men were getting on, and to find out whether the cloth would soon be ready. It was just the same with this gentleman as with the minister; he surveyed the looms on all sides, but could see nothing at all but the empty frames.

"Does not the stuff appear as beauti-

ful to you as it did to my lord the minister?" asked the impostors of the emperor's second ambassador.

"I certainly am not stupid!" thought the messenger. "It must be that I am not fit for my good, profitable office! That is very odd; however, no one shall know anything about it." And accordingly he praised the stuff he could not see, and declared that he was delighted with both colors and patterns. "Indeed, please your Imperial Majesty," said he to his sovereign, when he returned, "the cloth which the weavers are preparing is extraordinarily magnificent."

And now the emperor himself wished to see the costly manufacture, while it was still on the loom. Accompanied by a select number of officers of the court, among whom were the two honest men who had already admired the cloth, he went to the crafty impostors, who, as soon as they were aware of the emperor's approach, went on working more diligently than ever, although they still did not pass a single thread through the looms.

"Is not the work absolutely magnificent?" said the two officers of the crown already mentioned. "If your Majesty will only be pleased to look at it! What a splendid design! What glorious colors!" And at the same time they pointed to the empty frames, for they imagined that everyone but themselves could see this exquisite piece of workmanship.

"How is this?" said the emperor to himself. "I can see nothing. This is indeed a terrible affair! Am I a simpleton, or am I unfit to be an emperor? That would be the worst thing that could happen. . . . Oh, the cloth is charming!" said he aloud. And he smiled most graciously, and looked closely at the empty looms, for on no account would he say that he could not see what two of the officers of his court had praised so much. All his retinue now strained their eyes, hoping to discover something on the looms, but they could see no more than the others. Nevertheless, they all exclaimed: "Oh, how beautiful!" and advised his Majesty to have some new clothes made from this splendid material for the procession that was going to take place very soon. The two rogues sat up the whole of the night before the day on which the procession was to take place, and had sixteen lights

burning, so that everyone might see how anxious they were to finish the emperor's new suit. When the day arrived, they came to the palace with huge boxes.

"If your Imperial Majesty will be graciously pleased to have your clothes taken off we will fit on the new suit in front of the looking-glass," they said.

The emperor was accordingly undressed, and the rogues pretended to array him in his new suit, the emperor turning round, from side to side, before the looking-glass.

pretended to be carrying something, for they would by no means betray anything that looked like simplicity, or unfitness for their office.

So now the emperor walked under his high canopy, in the midst of the procession, through the streets of his capital; and all the people standing by, and those at the windows, cried out: "Oh, how beautiful are the emperor's new clothes! What a magnificent train there is to the mantle; and how gracefully the scarf hangs!" In short, no one would



WHEN THE DAY ARRIVED, THE ROGUES CAME TO THE PALACE WITH HUGE BOXES

"How splendid his Majesty looks in his new clothes, and how well they fit!" everyone cried out. "What a design! These are indeed royal robes!"

"The canopy which is to be borne over your Majesty in the pageant is waiting," said the master of ceremonies.

"I am quite ready," answered the emperor. "Do my new clothes fit well?" asked he, turning himself round again before the looking-glass, in order that he might appear to be examining his handsome suit.

The lords of the bed-chamber, who were to carry his Majesty's train, felt about on the ground as if they were lifting up the ends of the mantle, and

admit that he was unable to see these much-admired clothes.

"But the emperor has nothing on!" said a little child. "Listen to the voice of innocence!" exclaimed his father. And what the child had said was whispered from one to another.

"But he has nothing on!" at last cried out all the people. The emperor was vexed, for he knew that the people were right. And at last, believing that he was really unfitted for his throne, he resolved to give up trivial things and rule his kingdom well. The weavers, fearing to be punished, fled and were forgotten, and the emperor and his people lived in happiness for many, many years.

SCRAMBLEPIPE TRIES TO UNDERSTAND

THE GNOMES WHO SET OUT FOR CHRISTMAS AND FOUND THAT THE WORLD IS ROUND

IT was the twenty-fourth of June. The twenty-fourth of June is Midsummer Day. Screwworm said to Scramblepipe: "Christmas is coming."

Every gnome had a vast respect for Screwworm. When Screwworm spoke, everybody listened. When Screwworm asked a question, everybody thought, reflected, took a turn round the garden, or sat with their heads in cold water, before making an answer. Screwworm, in short, was immensely wise.

Now, the only gnome who was not in his heart convinced of Screwworm's wisdom was Burrowjack. Burrowjack was a gay little fellow. Once a week he had a punning day. It was the same day as Mrs. Burrowjack's washing-day. She filled the house with steam; he filled the air with puns.

When Screwworm said to Scramblepipe on Midsummer Day, "Christmas is coming," Scramblepipe immediately leaned his brow upon his hand and plunged into profoundest thought. He knew that there was something deep in the idea. Screwworm had uttered it.

Burrowjack, who was sitting on a toadstool outside the cave, blowing bubbles with soap-water from his wife's wash-tub, pricked up his ears and listened.

"I can't get it," said Scramblepipe, after a long meditation. "I'm sorry, Screwworm; it's stupid of me, but I can't get it. *Christmas is coming*. No; I don't follow you. Perhaps if I went out, took a Turkish bath, and lay down for an hour or two, it might come to me and I might understand."

"*There isn't time*," said Screwworm. "Scramblepipe, make yourself easy. This is not a usual thought. It surprises me. It's TREMENDOUS!"

"Then I give it up," said Scramblepipe, with a grateful sigh.

"It is, if I may say so," said Screwworm, "one of those ideas which come to the brain of only the wisest, and that only once in a million years. Be quite easy, Scramblepipe, but reverent; I will explain. Christmas is coming *because summer is going*. If summer is going, Christmas must be coming. Now, in a certain sense, it may be argued that,

while summer is here, Christmas cannot be here, too. But that is not my point. Summer undoubtedly is here, as much here as any one thing can ever be said to be here at all. But, what is Here? Have you ever seen Here? Have you ever taken it in your hands, examined it, punched its head, heard it squeak, or counted its waistcoat buttons? *Has it got waistcoat buttons?* We are in profound ignorance. Scramblepipe, I will let you into a secret. I don't believe there is any such thing as Here."

"It's coming to me," said Scramblepipe thoughtfully.

"Now, if Christmas is coming," continued Screwworm, "it is something that is alive and real. Far from going, it is coming. The two movements are as different as life and death. If summer is going, it is something mortal; if Christmas is coming, it is something immortal. If we stay here waiting, while something is going, we shall be left."

"Oh, I feel as if I am being tickled all over!" exclaimed Scramblepipe, interrupting. "I've nearly got it, nearly, almost, practically got it; but, not quite. It eludes me, just as I think I'm certain of it."

"A thing that is going is ceasing to be; a thing that is coming must exist, to be coming," said Screwworm.

Scramblepipe leaped to his feet.

"Got it! Got it!" he cried excitedly. He began to dance—singing, grinning, laughing, cackling and whistling. Suddenly he stopped dead, his face livid. "Screwworm," he said, "it has gone!"

"My point," said old Screwworm, "is this: a thing that is coming must have a place from which to come. If, instead of waiting for that thing to come, we go to the place from which it is coming, shall we not be in the possession of something that is never going at all? In other words, if—"

Scramblepipe buried his head in his hands.

"Come with me," said Screwworm kindly; "I will show you what I mean." They rose up and went out together.

"Can you tell me," said Burrowjack, "who bade the field farewell? I am speaking of the bird. Say it over slowly

to yourselves, thus: Who—bade—the field—fare—well.”

“His mother,” said Screwworm, “for no one else would take the trouble to do so.”

earth to find Christmas. Weeks and months passed. Their clothes were in rags, their shoes were worn to shreds, their legs were so stiff that they could



BURROWJACK WAS SITTING ON A TOADSTOOL OUTSIDE THE CAVE BLOWING BUBBLES

“No,” replied Burrowjack. “Beautifully no. The answer is Adieu drop.”

“Burrowjack,” said Screwworm, “leave this silly jesting, and hear my words. We go to discover Christmas.”

For many days and nights these intrepid explorers journeyed across the

scarcely lift their feet. But still they journeyed on.

“Courage!” said Screwworm, “courage! All we need is courage.”

“It’s certainly a splendid idea of yours,” said Scramblepipe. “It takes time to come to it; but it’s a magnificent idea!”

One day they arrived at a place where snow was falling. Their eyes shone with enthusiasm as they saw it.

"I feel," said Screwworm, "like a king approaching his coronation. Columbus discovering America is not nearly big enough for my feelings."

whole earth was buried under snow. Above this white earth the sky was glittering with stars. An immense moon shone through the trees.

"The moon looks very different," said Screwworm.

"There's no man in it, for one thing,"



SCREWWORM AND SCRAMBLEPIPE SUDDENLY FOUND THAT THEY HAD ARRIVED AT HOME

"I never saw such a splendid country in my life!" exclaimed Scramblepipe.

"You can feel the very air is Christmas, can you not?"

"I can smell it!" cried Scramblepipe, with enthusiasm.

They traveled on. Night fell. The

said Screwworm: "it smells different."

They traveled on and on until suddenly they heard a horn blow in the distance.

Screwworm fell on his knees. His face was dazzled with ecstasy. He waved his arms above his head.

"My idea!" he exclaimed. "My idea!"

I thought of it! Alone I got it! Oh, what it is to be a thinker!"

Scramblepipe cried:

"It is the horn of Christmas!"

Screwworm rose.

"This night the dream of my existence is realized. We have penetrated into the unknown. We have conquered Time. We are in the very land of Christmas!"

The horn blew again.

"Santa Claus is calling us!" said Scramblepipe.

They went on with joy.

"Think, Scramblepipe, think of that foolish Burrowjack, sitting on a toadstool, and waiting, *waiting* for Christmas to come to him!"

They rubbed their hands and laughed.

At last they came to the place from which the horn had sounded. They started and turned a little pale.

"I seem to know this spot," said Scramblepipe suspiciously.

Screwworm admitted:

"It certainly has a miserably familiar look about it."

"Why," cried Scramblepipe, "it's old Cuddledick blowing the horn!"

"It certainly looks like it," said Screwworm, whose face was green.

"My dear old boy," exclaimed Scramblepipe suddenly, "do you know where we are?"

"I do."

"We are at home!"

"Too true!"

"Home—in our own land, in our own country, in our own territory, in our own neighborhood!"

They entered the cave, and sat down, holding their heads.

"Hallo!" said Burrowjack. "Where have you been? Oh, I forgot! You've been to Christmas. How did you find the old gentleman?"

"Gentlemen," said Screwworm, "I and Brother Scramblepipe have been upon a scientific exploration. We have made an amazing discovery. I will tell it you."

"Not at Christmas! Not at Christmas!" pleaded all the gnomes, holding their heads. But Screwworm heeded not their pleading.

"Gentlemen," he said, solemnly and mercilessly, "the World is Round!"

THE KING, THE NOBLEMAN AND THE PEASANT

IT came one day to the ears of King Louis XII of France that a certain nobleman had very brutally chastised a peasant. As the king was called "Father of his people," and was truly beloved by all his subjects for the great benevolence of his heart, it can be imagined how this story would vex and distress him. He determined to teach the nobleman a lesson as to the treatment of those who were less fortunate than himself. But he kept this purpose secret. For several weeks he considered the matter, and at last he hit on a plan which he thought would be effectual.

One day he invited the nobleman to his palace, and kept him to dinner. He did not himself dine with his guest, but he ordered the most magnificent banquet imaginable to be served to the lord. Everything good to eat that you can possibly think of was placed on the gorgeous table, with the single exception of bread, which, by the king's express command, was not placed there. The nobleman was, of course, very much surprised by this strange omission, but he dared not, out of courtesy, ask for so

small and common a thing with so many rare and delicate dishes spread before him. But, of course, as the banquet progressed, the more did he feel the lack of bread, till toward the end of the feast he was almost enraged by the absence of such a necessary thing.

At this moment the monarch entered the hall.

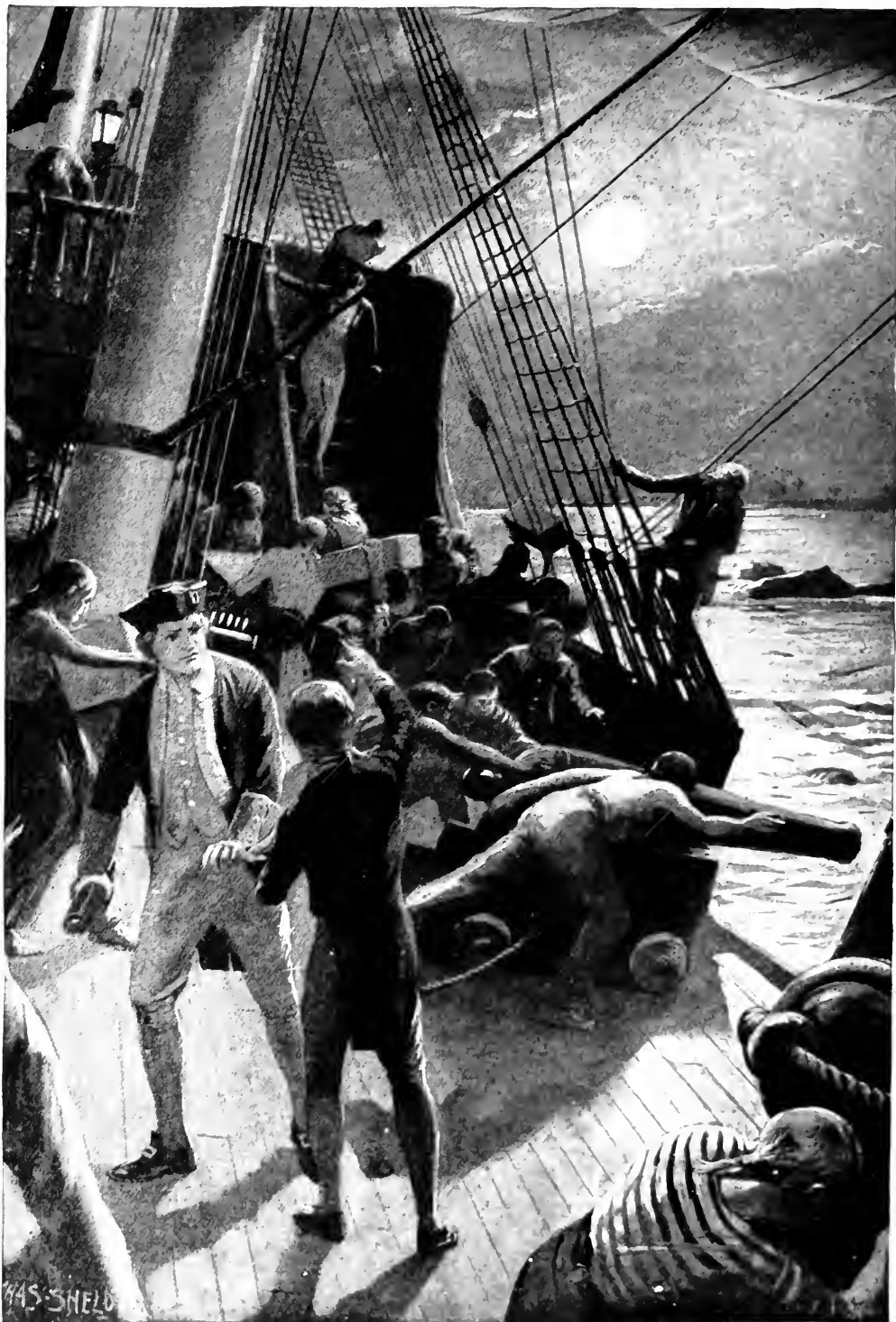
"My lord," said the king to his guest, "have they provided you with good fare?"

"Sire," answered the nobleman, "they have served a superb feast, a feast fit for a king. And yet, notwithstanding that, to tell your Majesty the truth, I do not seem to have dined well: for, in order to live, bread is necessary, and of bread at this banquet there was none."

"Go," responded Louis XII in a tone of great severity: "and therefore shall you the better understand the lesson I desired to impress upon your heart. As you need bread, my lord, in order to satisfy yourself, learn at least to treat with common humanity those whose labor it is to make it grow that you may be supplied."

THE NEXT STORIES ARE ON PAGE 1069.

THE REAL DISCOVERER OF AUSTRALIA



Captain Cook was a farm laborer's son, who ran away to sea and became a sailor. None of the men who had been to Australia before him had realized the fruitfulness of the country, but Captain Cook found that there were in it fair lands, and he called the land he saw New South Wales, and claimed it for England.

The Book of MEN AND WOMEN

WHAT THIS STORY TELLS US

THIS story of the discoverers tells us of Australia. Like the great continent of Africa, Australia, the greatest island in the world, was unknown for hundreds and thousands of years. When men began to sail round the world and first saw the Australian coast, it looked such a terrible land that they dared not enter it, and for years men knew only the coast and nothing at all of the real country. We read here of the men who first explored the coast and made known to the people the great and beautiful country which lies beyond. There are no sadder stories anywhere than the stories of the sufferings of the men who traveled through the great deserts to make Australia known to the world.

THE MEN WHO FOUND AUSTRALIA

DO you remember what Alice said to herself as she was falling down the rabbit-hole in Wonderland?

"I wonder if I shall fall right *through* the earth," she said. And then she thought how funny it would be to come out on the other side of the world.

"I shall have to ask what the name of the country is," she thought. "I shall have to say: Please, ma'am, is this New Zealand or Australia?" Then she thought people would think her a stupid little girl for not knowing.

So she hoped very much that if she did fall right through the earth to the other side she would see the name of the country written up somewhere. If Alice had not been dreaming she would never have thought such a funny thing. Fancy seeing a sign-post put up to say: "This is Australia!" Countries do not put up signs like that. They have their names on maps; that is all.

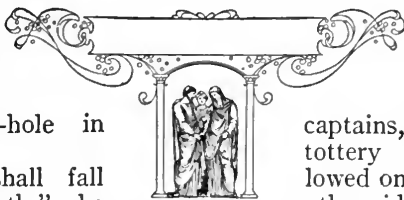
For some time before an actual map of Australia was made, there lived in men's minds rumors and traditions of a *Terra Australis*, or Land of the South, yet to be explored. Probably the first news of it came through sailors who, on their way to the spice-yielding islands of the East, were driven from their course, and caught glimpses of this uncharted shore. For, after Columbus had found America and Magellan had shown the way

through the southern gateway into the Pacific, an intermittent line of captains, riding unsteadily in tottery little ships, had followed on the path round to the other side of the world.

We do not know which white men from Europe first saw the island continent. Spain, Portugal, Holland and France all claim first honors. Old charts would be the best help, if it were not for the practice of those times to falsify maps so as to put rival nations off the scent of new lands and to magnify discoveries. It may be that the explorer who sighted Australia, sometime during the first half of the sixteenth century, had sailed from Portugal; for early maps of the Australian coast lines bear Portuguese names. But, whoever he was, he is lost to fame; his name and his grave, unknown.

French maps and Dutch maps were made before long. In fact, Dutch navigators gave descriptions and made charts of almost all the western coast, before the second half of the seventeenth century; and the Dutch government named the country New Holland.

One of the early expeditions was under a Dutchman named Dirk Hartog. He explored in a casual way about two or three hundred miles along the western coast in his little vessel, and landed at a spot which is still marked as Dirk Hartog's Island. To record his discovery and leave evidence



of his visit, Dirk chose a novel method. Instead of plunging into the ocean, sword and flag in hand, to take possession of the region, he scratched a message on his old tin dinner plate, nailed the plate to a post and set it up as a proclamation to all comers that he, Captain Dirk Hartog, of Amsterdam, in the ship *Eendraght*, had arrived there on the twenty-fifth of October, 1616. This relic survived all the possible dangers of more than three centuries, and is kept as a treasure in the State Museum of Amsterdam. But no one had in those days guessed the size of the land-mass on whose edges this navigator and that navigator had touched.

Whenever the adventurous travelers came upon natives, there was good reason for reporting them as "cruel, poor and brutal"; for, in such encounters, some of the white men from the ships were pretty sure to be killed and probably eaten by the wild, cannibalistic men of the land. At last England appeared on the scene, in the person of William Dampier, a most extraordinary character. Pirate, buccaneer and bully, he was at the same time scholar, poet and explorer. He would pause in ecstasy before some new bird, then set fire to a village; halt spellbound amid the scent of flowers, then continue the business of sacking a church.

He reached Australia in the course of an ordinary piratical cruise in 1688, being then in a humble position aboard the *Cygnet*, which he and his fellow sea-brigands called "home." They found their way along the coast as far as Cape Leveque.

Eleven years later Dampier returned in command of the *Roebuck*, and explored the northwest coast of the continent. He anchored in Dirk Hartog's Roads, and there gave to a sound the name Shark's Bay, which is on the map to-day. In a book describing his first voyage Dampier says definitely that whether New Holland be an island or a main continent, he is certain it joins neither Asia, Africa nor America. His second experience so depressed him that he doubted even if the so-called continent existed.

Dampier did not add much in the way of knowledge. But his books first fired Englishmen with eagerness to know more of the great mystery land. It was while in Dampier's company that Alexander Selkirk, the original of Robinson Crusoe, was marooned on the island of Juan Fernandez in 1704; and it was Dampier who, four years later, as pilot to Captain Woodes Rogers, aided in Selkirk's rescue from his seagirt prison. All that he did and wrote made Dampier picturesque

and notorious, and his books were stepping-stones across wide seas that led more and more Englishmen to the great southern land.

Like Tennyson's Ulysses, Dampier was eager to "follow knowledge like a sinking star beyond the utmost bounds of human thought," and he kindled imagination and fancy to such an extent that all the little middies in the fleet which won the battle of Trafalgar had Dampier's well-thumbed books in their lockers. His pictures of Australia were as gloomy as those of the men who had preceded

THE PIRATE WHO RESCUED ROBINSON CRUSOE



William Dampier, the first Englishman who saw Australia, watching the natives throw the boomerang, the strange "stick" so cleverly thrown that it comes back to the place from which it starts. Dampier was a pirate, but a brave man, and it was he who rescued the real Robinson Crusoe from the desert island.



This is the kind of country that frightened the first explorers of Australia. None of them thought that white men could ever live there. It was a wild and rocky land, with strange animals and savage people.

him. He showed it a land of savages and alarming animals, a land of sterile, deadly coasts and treacherous shoals. Australia had a very bad reputation till a modest village lad appeared to declare her splendor. The new herald was James Cook, a poor laborer's son who, born in 1728, ran away to sea as a boy, endured great hardships gallantly, won his way to position in the navy, explored and mapped Newfoundland and the river St. Lawrence, and in 1768 was placed in charge of an expedition to Tahiti in the Pacific for the purpose of observing the transit of Venus in 1769.

The expedition was a success, and on the way home Cook sailed round and charted New Zealand for the first time. Then he sailed along the east coast of Australia and made an astonishing discovery. Instead of the stern, forbidding conditions described on the western coast, here was a smiling land, fair and beautiful, reminding him so much of scenes at home that he named it New South Wales, and claimed it for England.

This was news indeed for people at home, and in 1772 Cook was given charge of another expedition to test the belief that there was in existence a land stretching all the way to the Pole. The mission occupied three years. Cook was thoroughness itself. Sent to seek mythical land, he went due south and sailed round

the world to prove that the fabled continent did not exist. Australia as it was and the unguessed New Zealand he revealed on wonderful charts; but the continent of Antarctica, since traversed by Scott, Amundsen and Shackleton, remained unexplored.

Cook's contributions to our knowledge of the Pacific and of Australasia were the most important made up to that time. All his work was done with the greatest modesty, and the achievement of which he was proudest was that in this three years' cruise, amid countless perils in unknown climates, he lost only one member of his expedition through illness. Like Magellan, Cook perished in an island fight, falling, during a fray with treacherous natives, before clubs and spears in Hawaii on February 14, 1779.

When it was found that Australia was a land in which white men could live, the British Government began to send people there. In those days men and women were severely punished for doing wrong, so the prisons in England were always crowded. To get rid of many of these poor people the Government sent them across the sea as far away from England as possible. Some were sent out to Australia. They settled down in Botany Bay, where the great city of Sydney was afterward built. They had nothing to eat except what was

brought in the ships from England, and for twenty years they had a very hard life, and were often nearly starving. They never thought of going inland to find pastures for cattle and places to grow corn. They kept near the coast, and could not imagine what lay behind the great Blue Mountains at their backs.

It took a long time to get to the other side of those mountains. Many men tried and failed; but at last, after twenty-five years, three men, named Wentworth, Blaxland and Lawson, were driven by despair to fight their way over them. Their cattle were starving, for there had been no rain. These three men thought that they might as well die while making a fight for life as die where they were. The mountains were nearly 4,000 feet high, with deep precipices; but at last the men crossed a high ridge which faced them at the top, and there below lay glorious green pastures and a rushing river. They had, for the first time, seen over the Blue Mountains; for the first time, they knew that there was more of the land than the little shelf of it on which for twenty-five years they had been forced to dwell. That was the beginning of the exploration of the interior of Australia.

More and more people were arriving in Australia now, and the way over the mountains was very important. A thoughtful governor made roads across them, and the path was open into the interior. But that was only a little of the work to be done. They wanted now to know a lot more about the land. They wanted homes away from the spot where the outcasts of the prisons had been placed.

While men were struggling along over the land, a daring young fellow named Matthew Flinders and his friend, a man named Bass, were getting to know more

about the seacoast. Flinders would never have seen Australia had he not read Robinson Crusoe. That made him wish to go to sea, and he studied all about navigating and the making of charts. When at last he went to Australia, he set about exploring the coast. He was able to show that Tasmania is not part of Australia, as was then supposed, but a separate island. He did more than that: he made quite sure that Australia itself is an island, the biggest island in the world; for, little by little, he sailed all round it. On his way home he was taken prisoner, and

not allowed to return to England for nearly seven years. The French, who captured him, stole the maps which he had made and the papers he had written, and printed them, pretending that they were their own and that they had made the discoveries.

The worst part of the work in Australia had still to be done. This was the exploring of the land itself. In some ways it was harder work than the explorers of Africa had had to do. There werenosavagebeasts; but there were savage men, who attacked the explorers and set fire to the grass and reeds, destroying the

food for the horses and bringing the men into great peril. Worse still were the great stony deserts and the want of water. It would take many books to tell how men toiled and died to find their way about the interior of Australia. Their sufferings were terrible. We can study only a few cases.

We must remember that Australia has an area of nearly 3,000,000 square miles, and that, when parties set out, they did not know whether there were rivers or lakes in the interior. They hoped that they would find both, of course, and some believed that they would find a great inland sea like the Mediterranean.



This picture shows Edward John Eyre and his servant ending an exploring journey through an Australian desert, almost exhausted.

Lieutenant Oxley made several journeys, and once traveled 800 miles, looking for the sea which was not there. His friend, a man named Cunningham, who was afterward killed by the natives, found a river; but nothing important was done until Captain Charles Sturt set out. He had convicts with him, but they bravely went wherever he led, in spite of great suffering.

The heat was so terrible that the screws which held his boxes together became loose and fell out; his comb was split into thin plates; the lead of his pencil dropped out, and his finger-nails were so baked that they snapped like pieces of glass. But in spite of this he made some splendid journeys. In some years, heavy rains make great

north. Starting from the shore of the sea in the south, he finished on the shore of the sea in the north. He was the first man in the world to do this. It was a very important work that he did, for, wherever he went, he made maps for others to follow, and afterward it was by the very path he had taken that the telegraph lines were laid from one side of Australia to the other.

He and his men suffered from want of food and, more often, from want of water. Once, when they were nearly dying of thirst, they came to a river which flowed at the bottom of some steep rocks. They rushed down to drink, but when they reached the water they found that it was salt as the sea. So, alas, were many of the lakes. The



Matthew Flinders.



John Stuart.



Captain Sturt.

These three men were among the earliest and bravest explorers of Australia. Matthew Flinders sailed all around the continent, the biggest island in the world. Captain Sturt found the great river Darling and explored 2,000 miles of country, suffering so greatly that he went blind. John Stuart was the first man to march across Australia from south to north, making maps.

lakes and marshes on the plains of Australia, and in other years, when there is no rain, these marshes are burned dry. Sturt found the plains in a dry year. The result was that reeds which had grown like forests—some of the nettles are fifty feet high—were so hard that it was impossible for him to force his way through them. But he found a great river, and called it the Darling. Altogether he explored 2,000 miles of country. So great were his sufferings that in the end he went blind.

His faithful friend and follower was John McDouall Stuart, who, after he had been out with Sturt, made three grand marches of his own. It took him a long time, but in the end he marched right from the south of Australia to the

water collects after the rain in great hollows, where tons and tons of salt lie. Some of the horses went mad from thirst, and one nearly killed Stuart. Another horse trod on him, breaking the bones of his right hand, so that he was unable again to use it. But after that, in spite of the broken hand, he made his greatest march.

Through want of food and water he became very ill, and at one time his mouth was so sore that he could not swallow. Savages tried to kill him. But in spite of everything Stuart kept on and on, until at last he came to the end of his journey and saw the sea from the land—the sea on the coast opposite to that from which his company had started. They looked out at the sea from the land

upon which Dampier had looked from the sea, so many years before.

Before Sturt was able to complete his work, Edward John Eyre made several attempts to learn more about the country. He had a good farm and many sheep, and he was a magistrate; but he gave up his home life to go into the wilds.

He believed that men could go on foot over the desert ways lying along the coast of the very big bay called the Great Australian Bight. If you look at a map, you will see Spencer Gulf, in the southern coast of South Australia. It was from there that he started. Now run your eye along to the west, almost to the far edge of the southern coast of West Australia. Then you will see King George Sound, where his journey ended. The country was so bad all the way that to travel so far and so long was most heroic, and when people in England heard about what Eyre had done, they gave him a splendid medal.

He explored inland, too, and discovered Lake Torrens. He thought it was a great sea, because he found it in a rainy year, when the lake reached far and wide. Eyre made his greatest journey along the Bight in 1841. He lived for sixty years afterward.

Many men were traveling now, and sad was the fate of several of them. Some were never again heard of. The most terrible story is that of the Burke and Wills expedition. These two men set out with camels and men and provisions, with good hopes of success. But from the beginning everything went wrong. In order to move with more speed they divided up the party, so that the leaders could first find a way. Most of the camels and provisions were left, while eight of the party went on. Then these waited while a man was sent back to fetch the others. The man sent back was a long time away, so Burke said he would go on without him. He left all the spare provisions. Then, taking Wills and two of the men, with six camels and two horses and provisions for three months, he set out again.

They reached the seashore, but had to hurry back because their food was running short. One of the men died, and when the three got back to where they had left the second party, nobody was there. All had gone on to a better

camping-place far away, on the very day that Burke and Wills returned.

Too ill to follow after the others, Burke and Wills tried to get home by another way, hoping that they might find water on the march. Wills, who had written an account of their travels, buried his books at the camp before leaving, but took with him one book, in which to write the further story of their doings. The man with them strayed away and was rescued by some kind natives; but the two leaders wandered on and on, lost in the dreadful desert. Their clothes were worn to rags. They had nothing to protect them from the heat of the sun by day, nothing to keep off the cold at night. All their food and water were gone.

Wills wrote for the last time in the diary, saying that they were starving and near death. There was no word of complaint in his book. He and Burke lay down in the desert, when the time came, and died like the brave men they were.

The man who had been saved by the natives was able in time to get back to his home. Then people were sent out far and near to search for the two poor men in the wilderness. But it was too late. The party that had gone out to seek them found their bones, which were then carried back to their home and buried with honors. A monument raised over them told what these men had done and suffered in exploring the deserts of Australia. The rescue party brought back, also, the diary in which the explorers had written their story. The buried book had been found by following directions cut into the bark of a tree.

Behind all the development of the Commonwealth of Australia as we know it now, we can read a long record of courage and heroic endurance in the lives of these men and others like them. In a century and a half after the time when Captain James Cook discovered that the new land in the midst of the South Seas had a coast that was friendly and inviting, more than five million persons were living in the provinces which had come to be a part of the island-continent. But, even then, not all of Australia's broad area—almost as large as that of the United States, Canada or Brazil—had been explored. There still remained ground for future heroic adventurers.

THE NEXT STORY OF MEN AND WOMEN IS ON PAGE 90.



A black bear from the Rocky Mountains has a game with a Syrian bear.

THE BEARS AND THEIR COUSINS

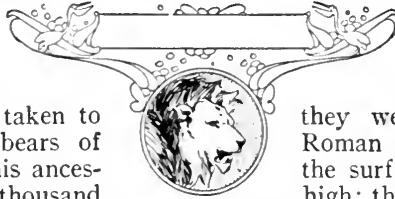
TIME brings great changes. When a naturalist from Rome visits London to-day, he is taken to the zoo and shown bears of many lands. When his ancestors came nearly two thousand years ago, there was neither a London nor a zoo, but there were many bears roaming about the land.

Droves of those British bears were captured, carried alive to the arenas of Rome, and set to devour Christian martyrs or to fight beasts as ferocious as themselves.

To-day, outside the zoos, Great Britain knows bears no more, but they are a widespread family and make life as alarming to people in some parts of the world as it was in the untamed wilds of long ago.

Only a few years ago a despairing cry came from Russia. Large numbers of wild bears appeared in the provinces of Petrograd, Novgorod and Vologda, where they devoured cattle and spread alarm among the terror-stricken inhabitants.

Before telegrams or newspapers were created, before civilization came into existence, famine ravished Western Europe as it has lately ravaged Russia; and bears increased existing distress by taking toll of the cattle and also of human life. It is not known when the last of the bears vanished from Western Europe. They saw the earliest Briton



steal in from the sea to possess the land; they saw the Picts and Scots arrive; they were present when the Roman legions dashed through the surf with their eagles held high; they saw Saxon and Dane

break in; and they certainly witnessed the Norman Conquest.

They hunted, and were hunted by, men who used stones as weapons, then bronze, then iron; and probably they went down finally before missiles in the discharge of which gunpowder was used.

We have only to cross into Europe to-day to find bears exactly like those whose hides had to be furnished as tribute each year to English kings down to the time of Edward the Confessor. It is the same species, the brown, that we find in the Pyrenees, in Germany and Hungary, in the three Scandinavian countries, in Russia, right through Asia as far as Kamchatka in eastern Siberia. Whether the big brown bears of Alaska should be classed with these or should be placed in a separate group is a disputed question.

The brown bear is a lord of the wilds north of the Himalayas; it ranges the hills from Afghanistan to Nepal, has its place in the scheme of things in Sumatra, and serves to keep fear alive in the less inhabited parts of Japan. The Kadiak bear of Alaska is

a monster exceeding all other bears in size. This immense territory of a single species, differing here and there in local racial peculiarities, is a testimony of the excellence of the brown bear's natural equipment. Brain is not at its brightest in the skull of a bear, but there is sufficient of it to house much natural cunning. Sight is poor; but the sense of smell is perfect, a faculty which detects the presence of an enemy and leads unerringly to food.

THE BEAR THAT HAS THE ACTIVITY OF A STEEPLEJACK

On the physical side, there are great strength and huge claws which can strip the flank of an ox and climb a tree as a steeplejack climbs a spire. Added to this the bear has superb teeth which can devour not only flesh, but roots, fibres—anything eatable—as the teeth of the great cats cannot. Man, mouse, horse or honeycomb are all equally acceptable.

A further feature is that we have bears spreading from the Far North away to warm latitudes. Those in the frigid winter sleep through the cold, fasting, as still as a tortoise. This does not apply to polar bears, but to other species. It is a wonderful thing that so huge an animal should have this power of suspending life, as it were, and lie foodless and unconscious for months, like the chrysalis of a moth.

If man could do such a thing we should forthwith colonize Antarctica, sleep the winter away, and spend the summer blasting ice to get at the gold and coal hidden beneath the steel-like surface of the frozen soil.

Why the polar bears do not hibernate is a mystery. The males positively do not, for they can be seen all the winter roaming hungry and grim down at the edge of the ice-field. There seals may be caught; and dead whales and sharks lie stranded, awaiting the teeth of the great scavenger; perhaps a fleeing Eskimo or a white explorer may be run down and devoured, or a sleeping man may afford an opportunity for a meal. Such a programme accounts for the activities of the male polar bear in winter.

DEVOTION OF THE MOTHER BEAR TOWARD HER LITTLE ONES

The case of the female is different. As winter approaches she begins a pilgrimage of devotion through the icy night. She marches inland and buries herself in

deep snow or among the rocks, and never moves from hiding till spring and the sun return. Then she goes out to meet her lord—but not alone. She takes with her her new cub, or two cubs, born and reared during the long months of seclusion.

Baby bears are not like spiders, which voluntarily go a long time without food. No; baby bears need constant food, and their mother's milk is the only source in that little white home in the North.

If the mother hibernated, all bodily operations would practically cease. Hibernation is an absolute trance, the nearest approach to death that flesh and blood can sustain. A bear in a deep trance could not suckle her babies. Therefore we are compelled to believe that this devoted mother lies in her snowy pit all the long winter fasting, dozing perhaps, yet ever alert to the needs of her little ones.

There is nothing else in life like this sacrifice; yet if we note the passionate eagerness with which a common hen broods her eggs in darkness for three long weeks we can understand the instinct. Here is a conscious creature which abstains from food while exhausting herself for the nourishment of her young. Mother love is the supreme marvel of all the instinctive emotions, and the most beautiful.

THE VALOR OF THE MOTHER BEAR IN FIGHTING FOR HER OFFSPRING

Bears are living horrors to us, as we are to them, when the question is whether a man shall make a dinner for the animal or the animal shall change into bear-steaks for the same man's meal, and its skin into the white robe of commerce. It is claws and teeth against the repeating-rifle and the expanding bullet, and only in the hundredth case does the artificial weapon fail before the natural weapon.

In such contests the mother bear, striving for the safety of her cubs, is a model of quick and anxious genius and pathetic valor. In one case, although wounded, the mother urged and drove her two cubs before her, and when they lagged she gave each a mighty thrust with her paw, sending them gliding fast ahead. They understood her plan, ran as hard as they could until she overtook them, placed themselves in position for another push, and so, between their own efforts and hers, escaped.

For sheer pathos, however, turn to an adventure of the crew of Captain Phipps's ship and the mother bear and two cubs

PORTRAITS OF THE BEAR FAMILY



Black Bear.



Himalayan Bear.



Spectacled Bear roaming the Andes in South America.



Skunk.



Polar Bear.



Kinkajou.



Ring-tailed Coati.



Common Raccoon.



The Weasel on the prowl.



The Ferret lies in wait.



The Sloth Bear takes a stroll.



The Grizzly Bear thinks it over.



Glutton, or Wolverine.



Sea-otter.



Little Skunk.



The Russian Bear asks for more.



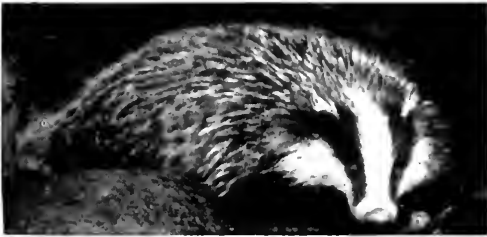
Stoat, or Ermine.



Ratel.



Beech-marten.



The Badger on the alert.



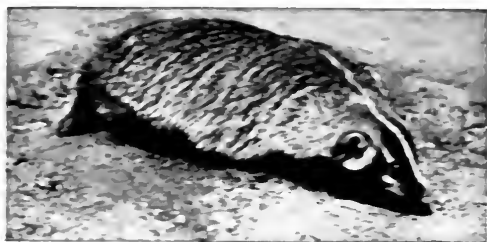
The Polecat looks surprised.



Isabelline Bear of India.



Great Panda of Northwest China and Tibet.



American Budget.



TITLE



Multi Bar.



Since 341.


$$Z: \mathbb{R}^n \rightarrow \mathbb{R}^n$$


Price





Chas. J. ...

$$Z = \frac{1}{N} \sum_{i=1}^N \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2} \left(\frac{X_i - \mu}{\sigma}\right)^2\right) \quad (1)$$

which approached the fire lighted on the ice to burn blubber. The men retreated as the ravenous animals came up, and let them draw pieces of blubber from the fire. Then two shots stretched the cubs dying on the snow, and the third mortally wounded the mother.

Only just able to crawl to where they lay, the mother carried each a piece of flesh. Perceiving that they could not eat, she tried to raise them with her feeble paws, crawled a little way ahead, and with mournful cries sought to incite them to follow her out of danger.

HOW THE BEAR HOLDS ON WITH HIS CLAWS IN A FIGHT

In the wilds polar bears are impressive in the extreme. The hairs on their enormous flat feet are of use in enabling them to grip the ice, and they lumber along in an inelegant gallop which runs down the swiftest man that ever fled for his life. Their very gait seems to harmonize with the rude horror of their surroundings.

So does another masterly form of approach which polar bears alone have acquired, because they alone need it. It is a gliding sprawl, effected by the bear lying flat with its four limbs outspread and kicking itself along with its hind paws. This method distributes its weight, and allows it to cross thin ice which it would shatter were that weight applied only at four points by a bear's feet.

No bear hugs. That is a fable. What they do is to strike, and then endeavor to hold with their claws while they bite. There is not much hope for the unarmed man in such an encounter.

THE PLAYFUL AMERICAN BLACK BEAR

The black bear was once common over the greater part of North America, and there are still many where there is thick timber. They are not so ferocious as those we have described, and prefer to avoid mankind if they can. They like berries, fruit and roots, though they eat also insects, fish, mice and other small animals, and some are very fond of pigs, lambs and calves. Only rarely do they attack man.

Some of them are decidedly brownish, and these "cinnamon bears" were once thought to be a distinct species. The Labrador bear is smaller and has a broader head, while other varieties live in the states along the Gulf of Mexico.

A polar bear had a desperate fight with a fine Bengal tiger in a menagerie at Edinburgh a few years ago, and though Bruin was frightfully lacerated, it was the tiger that died, with three ribs broken, and bitten through and through the throat before the end came.

Not many such encounters occur in the wilds, for the weaker there can fight and run away. In a confined space, however, even play may lead to disaster. All animal play is mimic battle, and one such game between a big brown bear and one of a smaller species began one morning in a cage.

The little fellow dealt a few shrewd nips, and then the big bear became enraged, seized the other by the throat, and, partly by biting and partly by holding it down in the water, killed it. Then it dragged it off to its den and began to eat it.

THE GRIZZLY BEAR WITH ITS FIERCE AND APPALLING TEMPER

We have noted that there are several local races of the far-spread brown bear, so must remember that the famous grizzly bear, formerly included in the group, is now marked off as a separate species. Its name covers two meanings. It describes its more or less gray "grizzled" coat, and its grisly or fierce and appalling temper when disturbed.

Perhaps the grizzly is the most ferocious of all bears when angered. He is also the most intelligent and has learned to fear man. He seems to know that his claws and teeth are no match for a bullet, and seldom attacks man except in self-defense, unless he should happen to find one sleeping. In the Yellowstone Park there are many grizzlies, but they seldom cause any trouble.

In Alaska there is a special variety of grizzly. The great California grizzly is believed to be extinct. In the Hudson Bay district there is the smaller variety known as the barren-ground grizzly; but the common grizzly spreads terror throughout the Rocky Mountain range. Some of these brutes weigh over half a ton!

It is thought that a big Central Asian bear is a true grizzly; and names would suggest that the American black bear and the black bear of the Himalayas are of the same species. They are not; the Himalayan bear can always be distinguished by the white inverted crescent on its breast which the American lacks.

Similarly, the so-called blue bears of Tibet and of British Columbia are distinct. The spectacled bear of the Andes, so named from the tawny spectacle-like rings round its eyes, is black, but not a black bear by title. Nor does the curiously white-patched, white-muzzled, black-bodied Bruang, or Malay, bear come into those known as the black species.

The most interesting of less familiar bears is the sloth bear of India. Like the Himalayan black animal, it has the white chevron on the chest, but its snout is a dingy gray. Its hair is excessively long and coarse, and its weight does not exceed 350 pounds. Its habits are quite without parallel in the animal world.

HOW THE SLOTH BEAR OF INDIA GETS A DINNER

Like other bears, it will kill and eat anything; it will take honey and vegetation, and it is also a great ant-hunter—especially of the strongly fortified termites. With its powerful great claws it rips the side out of such a fortress. Then “it huffs and it puffs” till it blows the dust away inside, draws in mighty breaths, and in so doing draws the insects and their grubs into its mouth. That is a unique manner of getting a dinner.

We must pass from the bears to their nearest kin, the raccoons. The living bridge leading to this family is the panda group, two genera, each of a single species.

The great panda of northwestern China and Tibet is marvelously bear-like, but its cousin, the long-tailed panda, with its long slim body, its bushy tail, its claws which can be moved a little in and out of their sheaths, suggests an animal as to which Nature had two minds. She began a bear and left the creature almost a cat, so that men call this common panda the cat-bear—a very helpful description.

The raccoons belong to America—broad-headed, with a fox-like snout, with fine climbing feet, thick fur, handsome ringed tail, an appetite for anything, not excepting freshwater tortoises and crayfish. The coons are shy tree-haunting creatures that sometimes leave the woods to call on a poultry yard. One peculiar habit of the raccoon is to wash its food before eating.

The nearest ally to the coon is the cacomistle. It is cat-sized and almost entirely a flesh-eater. Next come the bassaricyons of Central America; the coatis, with such

fantastic long snouts that they are called proboscis-bears; and finally the kinkajous of the same great land, with tails which cling, an expression like a lemur, and an amiable nature which admits of their being readily tamed.

THE ANIMALS THAT ARE HUNTED FOR THEIR VALUABLE FUR

Following established practice, we must, for convenience' sake, class the Weasel Family among cousins of the bears. That has always been done, but recent discoveries suggest that the group really developed from the same branch as the civets. It is an important family, including the weasels, the badgers and others. So valuable is the fur of some of the species that pursuit has led to almost as much exploration as unknown lands of gold.

First come the tayra and grison of tropical and South America, and in the case of the grison, Mexico as well. The larger of the two, the tayra, sometimes haunts in little packs in wood and on plain; the grison might be a stoat, from its habits, especially where poultry is to be found.

Martens are known to us from the presence of that bloodthirsty little hunter the pine-marten, or American sable. At home in the forsaken nest of a crow, it descends at night to track a hare or spring upon an unsuspecting bird. But pine-martens are rare enemies to rats and mice. The beech-marten does not come so far west as its fellow, but it ranges away from Central Europe and Italy far into Asia, and, though eager for blood, has such a passion for fruits that tree-trunks in its neighborhood have to be spread over with some offensive fluid to prevent it from ascending them.

THE FERRET SHOWS ITS VARYING TEMPERAMENT AND ITS TEETH

The extreme richness of its splendid fur makes the Old World sable the most famous of all the marten group. Eastern Siberia and Kamchatka are its last strongholds, and there rodents, fish and berries are the materials out of which the precious fur is developed. Largest of all the martens is the fisher-marten. It eats fish and small animals, snakes and even the prickly porcupine.

Shorter in the leg, longer in the body, and smelling abominably, the polecats are widely distributed over Europe and Asia, and there is one American species.

However, in this country the name is often given to the skunk, of which we speak below. From the wild polecat the ferret has been developed. The Romans used them for hunting, and in England they are much used in hunting rats and rabbits. They are fierce fighters.

The mink is in Europe, America and Asia. It is a mighty hunter, climbs, swims and runs swiftly, and when cornered, will fight. The weasel proper is all over Europe, Central Asia and North America. Some species are as much as sixteen inches from nose to tail. They sometimes kill for the love of it, leaving the bodies of their victims. In the North weasels turn white in winter and are called ermines, though the ermine really belongs to the Old World. There it is called a stoat. Its fur is much prized. It is stouter and stronger than the weasel, measuring up to eleven inches, with a tail up to five inches.

THE AMAZING SKILL OF THE POWERFUL WOLVERINE

Big as he is, with powerful claws and teeth as strong as a small hyena's, the glutton, or wolverine, found in the north of the New World and the Old, is a weasel. Trappers who cannot catch him, but whose beaver-snares he robs with amazing skill, call him names which are not his nor deserve to be. He is a greedy genius.

Ratels follow. These are badger-like animals confined to India and Africa. Their love for the product of the bee gives them the name of honey-badger. As pets they have the startling habit of throwing the nimblest somersaults, revealing a latent talent for acrobatics which would make their fortune in a jungle gymnasium.

The most impressive weasels, in an offensive sense, are the skunks. They belong entirely to the Americas. They are beautiful animals, about two feet long, marked with black and white. They eat everything and show little fear of man or beast. They have the power of offending men and animals by the foulness of a fluid which certain glands under the tail enable them to squirt out. Even the boldest-hearted hunting dog will howl and lie down, or run away and hide, if set to face this unsavory beast.

Cape polecats, or zorilles, employed as friends in Boer households, where they are called mouse-dogs, link the skunk

with ferret-like curiosities whose outlines also suggest little badgers; and they in turn provide the link associating badgers with the rest of the group.

Our badger is courageous, ancient, honest and inoffensive. He is so powerful of jaw that he can eat anything that contains nourishment, so sturdy a digger that he builds himself a subterranean fort-city. There is little difference between the European and the American badgers. Both are heavy and slow.

THE OLD BADGER THAT DECKED ITS HOME WITH BLUEBELLS

One English badger which was suspected of eating rare water-birds was tracked to his lair. The gallery leading to it was like a charnel-house, white with dead birds' bones. But the old badger was an artist—his home was all decked with bluebells! The trackers caught him, but, fine to relate, he was released, far out in the country, where food abounds amid the bluebells, but where priceless waterfowl are sufficiently cautious to keep away.

Our last word is for the otter, the splendid creature which in Europe is hunted with hounds and with spears. Their brilliant swimming and tunneling, their fine teeth which grip fishes that elude fingers, their extensive travels when food or water fails, make otters very efficient in the struggle for life, and they are at home wherever the dog tribe is found. The American otter is larger than the European and, like it, is equally at home in water or on land. In fact, it has come to resemble a seal.

TWO FIGHTING OTTERS THAT PUT A MAN TO FLIGHT

Of nearly a dozen species the sea-otter is the most famous, partly because its fur is so luxurious, partly because a craze for that fur has caused men to hunt it almost out of existence.

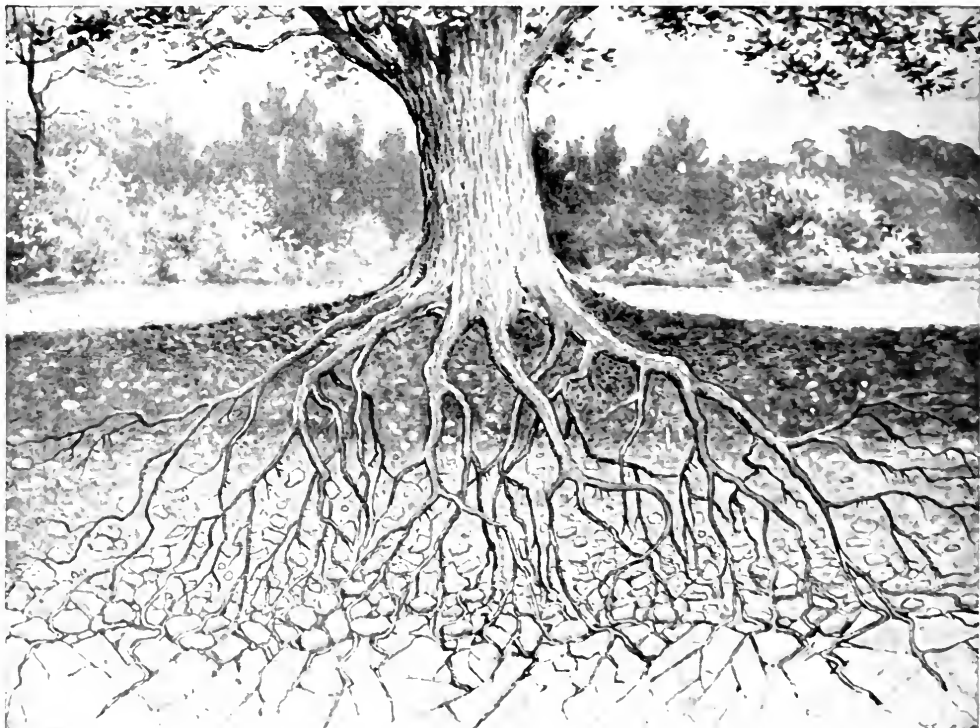
There is something very attractive about the common otter. How is it possible not to like an animal which has playgrounds and constructs slides on a steep river bank and toboggans down them like a laughing child? The otter is a warrior at will. Two of them put to flight a man who attacked them with a pitchfork, and another killed and ate an impertinent ferret which sought to drink its blood. Brer Bear could not have been more judicial, more fitly final.

THE NEXT STORY OF ANIMAL LIFE IS ON PAGE 997.

MARVELOUS POWER OF A GROWING TREE



There is a mighty power in a growing plant of any kind. A mushroom has been known to lift a paving-stone out of place and you may have seen the sidewalk lifted and pushed out of place by a growing tree. A tree which has entered a small crack in a rock as a young twig may burst the rock asunder.



What the trunk of the tree can do in one way the roots do in another. The tiny filaments enter every crack and crevice they can find, and by the acids they give out they eat away the rock. As the root grows, its branches swell with moisture and, acting like wedges, may split the rock into fragments.

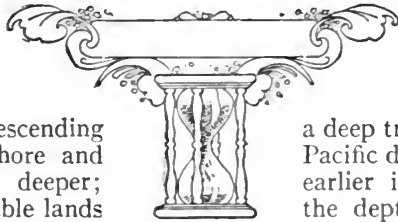


HOW DEEP IS THE SEA?

THE sea varies in depth quite as much as the land varies in height. There are slopes descending gradually from the shore and getting deeper and deeper; there are plains and table lands that run for miles at about the same depth; and there are precipices with sheer descents into chasms over six miles deep.

All these facts are known as the result of thousands of soundings taken over many years in various parts of the ocean. Charts have been prepared of the Pacific, Atlantic and Indian oceans showing the depths discovered at different places, and on these charts six thousand spots are marked where the depth is over a thousand fathoms, or six thousand feet—considerably over a mile.

Of these great depths, 2,500 are in the Atlantic (1,873 in the North Atlantic and 627 in the South); 2,472 are in the Pacific; and over 1,000 in the Indian Ocean. Up to 1912 the deepest sounding recorded anywhere was 5,269 fathoms, or 66 feet short of six miles. This was in the North Pacific near the island of Guam, in the Ladrões. This sounding was made by the American ship *Nero* in 1906, but in 1912 the German vessel *Planet* found a deeper place forty miles northeast of Mindanao, one of the southern islands of the Philippines. This great depth,



which has been known ever since as the Planet Deep, is the continuation of

a deep trough in this part of the Pacific discovered by the *Planet* earlier in the same year, and the depth recorded was 5,349

fathoms, or six miles and 414 feet. In 1924 the Japanese vessel *Manchu* found a deeper place fifty miles off the coast of Japan. It let out 32,644 feet of wire without touching bottom. Ten soundings over 5,000 fathoms deep have been made in the Pacific Ocean.

In the Atlantic the deepest sounding recorded is 4,561 fathoms in the Nares Deep to the north of the West Indies; and in the Indian Ocean the deepest is 3,828 fathoms in the Wharton Deep to the south of the East Indies. A fathom is, of course, six feet.

Of all the soundings taken in different parts of the world, about fifty exceed 4,000 fathoms, and it is interesting that, though roughly the great depths of the sea correspond to the great heights of the mountains, the greatest sea depths are about a mile in excess of the greatest heights on land. To travel from the top of the highest mountain to the bottom of the greatest depth in the sea would mean covering a perpendicular distance of over 11 miles, and this on a globe six feet in diameter would be represented by a scratch measuring not more than a tenth of an inch in depth.

Even these great ocean depths are very far from piercing through the earth's crust, for they represent only about an eighth less thickness than elsewhere. The average depth of the ocean is from 10,000 to 15,000 feet.

It is interesting to consider how men find out the depth of the sea. The simplest plan is by letting down a weighted vessel by a rope, marked off at intervals, and when it is felt that the vessel has touched the bottom, the rope is pulled up again to see what has got into it. But this will do only for comparatively shallow depths.

When it comes to sounding great depths, we must first abandon the rope and use a fine wire, as was first done by Lord Kelvin, and an apparatus records automatically the moment when the sinker, as it is called, touches the bottom. The wire rubs against the water far less than the rope, and when we are dealing with lengths of miles of rope, that is an important matter. Also, when great depths are being sounded, it is hopeless to expect to drag up the weight that has sunk the wire. Devices are therefore used that will let the weight go at the bottom, and perhaps some tiny instrument can be left at the end of the wire, not too heavy to pull up, which will carry some evidence of the life existing at the bottom.

WHAT DOES THE PATTERN IN A BRICK WALL MEAN?

The bricks which are commonly built up to make a wall are 8 inches long, 4 inches wide, and about $2\frac{1}{4}$ inches thick. The bricklayer binds them with mortar, which is made by mixing together with water either lime and sand, or cement and sand. Mortar, however, is not a strength to the brick-work, but a weakness, and because the mortar joint is a weak point the bricklayer avoids arranging his bricks so that one joint comes directly over another.

If a wall were built with the mortar joints directly over each other, and a heavy weight, such as an iron column, were placed on a part of the wall, all the mortar joints would give way under the strain, and the column would sink and push the bricks down or out. Brick-work is built in a regular pattern to avoid weak joints, and this pattern is called a *bond*.

Some forms of bond are American,

English and Flemish. In English bond the brick wall is built of layers, or "courses," of bricks laid alternately, one row all lengthwise and the next row all endwise. A brick put lengthwise is called a *stretcher*; a brick laid sidewise is called a *header*. We can easily see how stretchers and headers in alternate layers prevent the weak mortar joints from coming over each other. In order to start the rows of headers right, a small piece of brick has to be built in next to the first header of the row; and this piece is called a *closer*. The pattern of Flemish bond is different, and some people think it looks better; each row is composed of alternate headers and stretchers. In American bond five or six rows of stretchers are so laid that the joints do not come together. Then a row of headers is laid.

HOW DOES COLOR GET INTO A BUD BEFORE IT IS OPENED?

It does not. We might as well ask why it should not. The sun does not make the color of a flower directly, as if it painted the color on the petals by shining on them! Of course the life, and therefore the colors, of the plant depend on the sun in the long run, but the color of the petals is not made directly by sunlight.

The plant begins in a seed, which is already constructed in a wonderful way that no one has yet been able to understand. Among the thousands of parts of the seed there are some which, though they have no color themselves, are yet able to make the colors proper to the various parts of the plant when the time comes. These things in the seed, which *determine* the future of the plant, are often called *determinants* for that reason.

DO WE KNOW HOW FAR THE SKY GOES?

If we study the distance of the stars, that in itself, of course, teaches us something as to "how far the sky really goes." And when we have learned the enormous distances of some of the stars which we can see—distances so great that there is no space to write them in miles, so that we have to speak of light-years, meaning the stupendous distance that light travels through in a year—even then we have not begun to say how far the sky goes.

If we had a telescope a million times bigger than the biggest we have, and then could find the farthest star that it would

reveal, we should probably be no nearer the end of the sky than we are now. For space is apparently beyond all measuring by human means.

WHY MUST A BABY LEARN TO WALK?

Many animals are able to run about almost as soon as they are born. A chicken walks at once, and a calf is soon frisking about its mother. A baby is born quite helpless and requires a long time to learn to toddle along.

The reasons are difficult to tell in simple words. In the first place, walking on two legs is difficult for any of the mammals. The bones and muscles and many of the organs seem better suited to movement on all fours. The second reason has something to do with length of life. A chicken is full grown in a year, while it takes a baby about twenty years to grow up. You would expect a chicken to develop faster than a baby. The third reason helps to explain the second. It has to do with what we may call the inherited gains of the race. There is really very little for a chicken to learn about the business of being a chicken, but human life is very complicated. Each generation must learn a great deal of what the race has accomplished before. Therefore the period of infancy must be longer than in the case of a chicken or other animal which has less to learn.

WILL ALL THE PEOPLE EVER SPEAK THE SAME LANGUAGE?

Probably not. Spoken language differs from written language. We may be sure, however, that some day there will be a common language which will be used for business purposes, and for speeches on occasions when people from different countries are present.

This language will doubtless be based on existing forms of speech, but it will certainly be a great deal better and simpler than Esperanto, or any of the artificial languages that were invented before it. The useful world-language will very likely have as much Latin in it as Esperanto has, but it will certainly follow modern English in doing without all the clumsy and unnecessary changes of gender and case and time.

But it is a very different thing to say that all men will ever come to speak the same language. Such a notion allows nothing for invention, for local peculiarities, and for slang, which grows into reg-

ular language in some degree. And the best proof that men will still continue to speak in their own way is to be found in what is now happening to English in the United States of America, in Canada, in Australia and in South Africa. There we find that the spoken language, still more than the written language, is taking its own shape.

The 1,800,000,000 inhabitants of the earth are said to speak 3,424 languages or dialects, but nearly 600,000,000 speak the seven chief European languages in these proportions: English, 180,000,000; German, 120,000,000; Russian, 100,000,000; French, 70,000,000; Spanish, 55,000,000; Italian, 50,000,000; Portuguese, 25,000,000. The reason for the large number of Spanish- and Portuguese-speaking peoples is that Central and South American countries speak these languages.

WHY ARE DARK THINGS WARMER THAN LIGHT THINGS?

A thing is dark, even in the light, because, instead of reflecting, or throwing back, the light from its surface, it keeps the light, or *absorbs* it. Light and radiant heat are really the same thing, and as a rule anything absorbing or reflecting the one absorbs or reflects the other. So light clothes throw back from their surface the light and the heat that strike them. Probably nothing will throw back all the light and heat that strike it, and even the whitest snow will melt under the sun's rays. But while light things keep only a little of the light and heat that fall on them, dark things absorb practically the whole, and so they get warm.

WHY DOES A WASP'S POISON NOT HURT THE WASP?

We can ask the same question about many animals and plants containing substances poisonous to creatures of other kinds, but not to themselves. For instance, why should a poisonous serpent biting itself or another serpent of the same kind do no harm with its poison?

We are gradually coming to realize that the answer is to be found somewhere in the chemistry of life. The fact that different creatures differ from one another must mean, among other things, that each kind of creature has a chemistry peculiar to itself. That is the real explanation of the fact that the wasp's poison is not poison to the wasp, nor the snake's poison to the snake.

Each kind of creature, then, has its own special chemistry. For the purposes of its own life it produces certain substances, useful as means of offense or defense. But it is in the very nature of the case that no kind of living thing could produce and retain substances poisonous to itself and continue to exist.

WHAT MAKES THE ROOTS OF A TREE GROW DOWNWARD?

The use of the roots of trees lies in the ground. They serve, first, to give the tree a firm hold, so that the wind shall not upset it. And the roots are the mouths of trees, we might say, for a great deal of the food of the tree is sucked out of the ground by its roots. On the other hand, the roots contain no chlorophyll—the green stuff by which the leaves use the light—and so there is no need for them to be exposed.

But all this does not answer the question. We know why it is good for the tree that its root should grow into the ground and not into the air, but that does not tell us *how* the roots know which way to grow. Certainly gravitation helps. It does this, not merely by pulling the roots into the earth, but by letting the roots know or feel where the earth is. Sir Francis Darwin, the son of Charles Darwin, has proved that plants are able to know where the earth is. They have a gravitation-sense, as we have a light-sense or a sound-sense, and this helps to guide the roots to grow downward. Also, the roots grow at their tips, where they get their food in the soil, and so they grow in many directions, just where they find the food they live on. We can understand how the growing tip of anything will grow in the direction of its food.

WHAT DO WE MEAN BY THE TRADE WINDS?

The trade winds are the most regular winds in the world. The trade wind in the northern hemisphere blows steadily from the northeast, and the trade wind in the southern hemisphere blows steadily from the southeast; and both vary so little that in the old days sailing ships could rely on them with absolute confidence.

What is the force, or what are the forces, behind them? The forces are two—the heat of the sun and the rotation of the earth on its axis. The heat of the sun in the tropics causes the air in these regions to rise, and cold air from the

Poles rushes in to take its place. These cold currents, rushing south from the North Pole and north from the South Pole, are the foundations, so to speak, of the trade winds. But, if that were all, the trade wind in the northern hemisphere would be a north wind instead of northeast, and the trade wind in the southern hemisphere would be a south wind instead of a southeast. What is it that gives the trade winds their westerly direction?

It is the rotation of the earth. As the winds rush north from the South Pole, and south from the North Pole, the earth is rotating from west to east through the winds, and so the winds seem to blow from the northeast and southeast. If a man travels fast eastward in a motor car while a wind is blowing from the south, the wind will seem to be southeast; and if the wind is blowing from the north it will seem to be northeast. In the same way, as we rush eastward on the rotating earth, the north and south winds from the Poles seem to be northeast and southeast winds.

WHAT IS THE USE OF HAVING TWO EYES?

The possession of two eyes enables us to form a judgment as to the bulk of an object, or as to the depth of a depression, or as to the real position of one object in relation to another. As our eyes are set from about two to two and a half inches apart from each other—measuring centre to centre—they each get a slightly different view of the object looked at.

Fully to realize this, let us take a round pot bearing a printed label, and put it on the table before us with the label half turned away from our eyes. If we do this and look at the pot, closing each eye alternately, we shall find that one eye can read more of the label than the other. The right eye sees more of the right side of the pot and the left eye sees more of the left side; so that with our two eyes we see more than half the pot.

It is this looking round the sides of an object that gives us the impression of solidity. An artist cannot give us this impression, no matter how clever he is. But a photographer can do it by taking with a double camera—the lenses of which are set apart like the eyes—two pictures of the same object. These two pictures are set side by side in an instrument called the stereoscope, and we look at them with our two eyes, the right seeing the right-hand picture only, and

the left seeing the left-hand picture only. As a result, we see solidity, one object standing out from another as if we were looking at real things.

Thus, the two eyes are not for ornament alone, but for real use. Why it is that the brain is able to combine the two pictures as it does we do not know.

WHY DOES QUICKSILVER RUN AWAY WHEN WE TOUCH IT?

These questions have been asked and wondered about ever since mercury, or quicksilver, was discovered more than two thousand years ago. There is no other element, and no compound, which behaves in the same curious way as mercury—which almost seems alive.

The reason is that here we have something which is liquid, and has the properties of a liquid, yet is exceedingly heavy, while the tiny particles of it have a very great attraction for each other. The reason we cannot pick up quicksilver is that it is a liquid. We should not expect to be able to pick it up any more than to pick up water, only it looks so different from any other liquid we know that we can scarcely believe it is a liquid, and so we expect to be able to pick it up. Being a liquid, it runs, as water runs; and that is what happens when it is touched. We can only begin to understand the curious way in which mercury behaves if we first remember that it is a liquid.

WHY DOES THE TEA RUN THROUGH A LUMP OF SUGAR?

Water, and watery things like tea, behave in just the opposite way to quicksilver. When they get a surface on which they can spread themselves, they do so; but quicksilver keeps to itself. You would not get quicksilver to run up into a lump of sugar. We must think of the sugar as if it were a lot of little tubes all put together, and then it is easy to show, by a simple experiment, what happens.

If we take a thin glass tube and dip it into water, the water will spread itself out on the inside surface of the tube, and will rise a little higher in the tube than outside; and where the water stops it will have a cup-shaped surface, because the water all round, where it is next to the glass, creeps up the glass a little. It is just this that happens when tea runs up a lump of sugar.

But mercury acts in exactly the opposite way; it is not attracted by a surface, but pushed back, as we can see for our-

selves if we dip a thin tube into it. The mercury is pushed back by the tube, and the surface of the mercury is shaped like a cup upside down, because all round the edges of it, it holds itself back from the glass, just in the opposite way to the water, which creeps up the glass. This simple experiment is worth making in order that we may see the difference in liquids.

WHY WILL GLASS NOT BEND LIKE STEEL?

All we can say is that different kinds of matter have different properties; some kinds will bend, or be hammered into thin sheets, or be drawn into long wires without breaking, while others will not. The differences depend on the way in which the molecules of the thing in question are joined to each other. Glass is one of the things that are rigid and brittle, while wax, for instance, can be bent or molded into any shape.

But it is very interesting to find that the same thing may sometimes be brittle and sometimes plastic, according to circumstances, and the most important of these circumstances is the temperature. Glass itself gives us an instance of this. It is quite true that glass, as we know it, will not bend, or, rather, that it will not bend much.

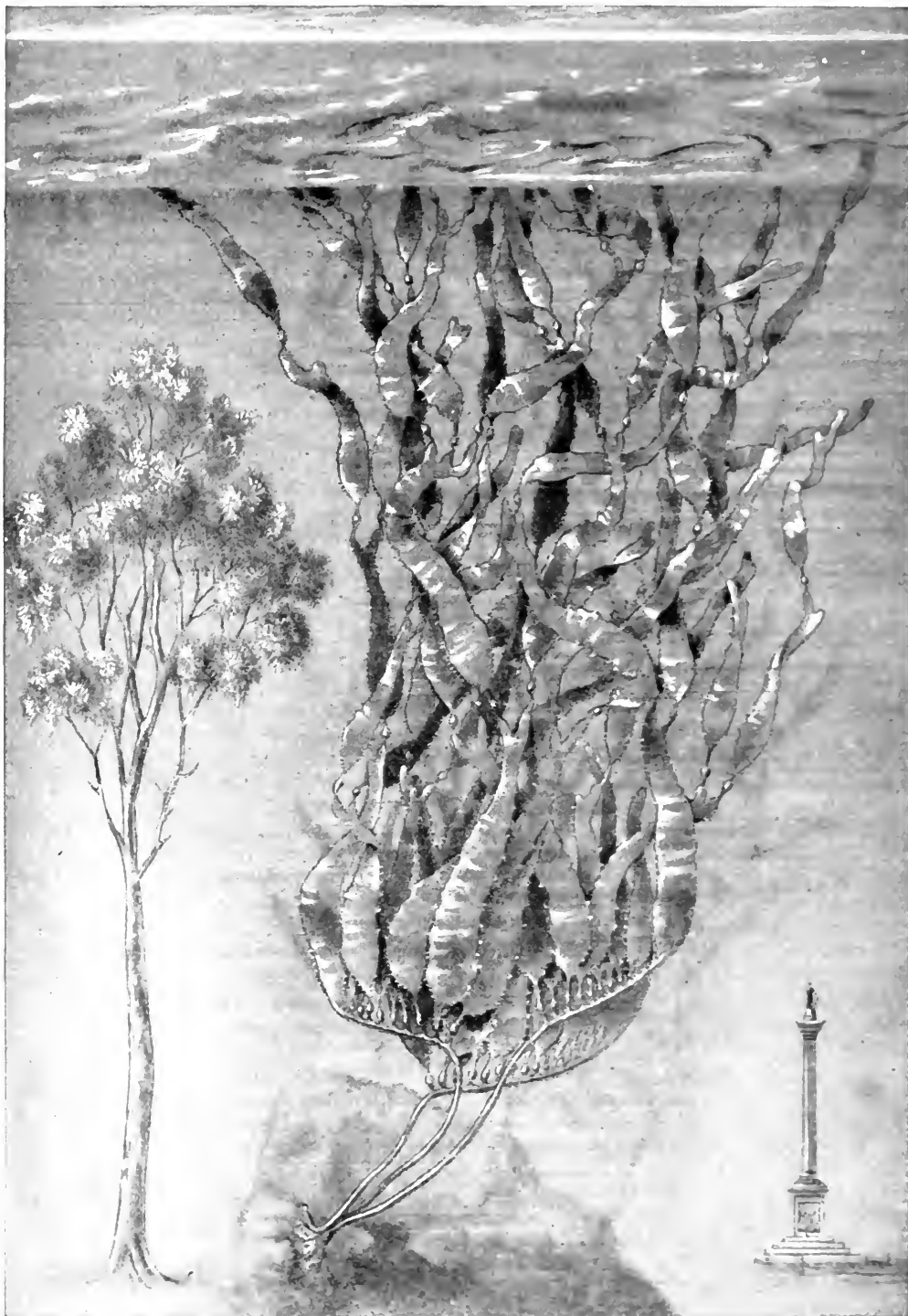
If we make the glass hot—red hot, or a little less than red hot—it will bend quite readily into any shape we please. Then we can cut it with scissors, or draw it out with pincers, or mold it into any shape we like. This is the general rule with a great many things which are rigid and brittle when they are cold. It must mean, of course, that when the glass is made very hot, its molecules do not hold on to each other so tightly.

CAN FLOWERS TALK TO ONE ANOTHER?

No. Flowers are wonderful in many ways, and they can do many things which even men cannot do; but they cannot talk to each other, either by words or by expression or by any other kind of movement. Only the animal world can do this, because only in the animal world has life developed what is called a nervous system.

No plant has a real nervous system, much less anything like a brain. We know that many of the lower animals can, in effect, talk to each other, but all of these have some kind of nervous system.

THE GREAT PLANT CLIMBING IN THE SEA



The most amazing plants grow in water and not on land. Shackleton's ship, the *Quest*, found gigantic marine forests near Tierra del Fuego, and soundings showed that some of the monster seaweed plants peeping above the water were 600 feet high, over 100 feet taller than the tallest land tree—the Australian eucalyptus, shown on the left, which sometimes reaches 500 feet. The monument on the right is 145 ft. high.



PLANTS AND THEIR ANCESTORS

WHEN living creatures began to be we do not know, but some of the great events in their history are clear. It is almost certain that plants got the start of animals, for plants are able to feed on air, water and salts, while animals are seldom able to feed at such a low level.

It is almost certain that the first thoroughly successful creatures were microscopically small. They swam about in the sea by means of one or more vibrating lashes of living matter. They possessed chlorophyl or some other coloring matter which enabled them to use the power of sunlight, and they were probably nearer to plants than to animals.

Whenever and wherever well-lighted shallow waters were established, some of the pioneer free-swimming plants would anchor themselves, and thus began the history of fixed seaweeds. When we look at the beds of seaweed exposed at low tide, we are looking at a very old type of vegetation; and it may be that some of the beautifully colored kinds are extremely ancient forms of life.

When continents and ocean basins were established, and when the shores were slowly raised, as often happens, the conditions began to be favorable for land plants, which gradually ap-

peared, with true roots for absorbing water and salts from the soil, and true leaves for absorbing gases from the air. Or it may have been that some of the simple plants of the sea made their

way up estuaries to rivers and lakes, and, after sojourning in swamps and marshes for ages, began at last to colonize the dry land.

Some of the liverworts of to-day may be representatives of the ancient pioneers. In any case the rock-story does not show any fossil land plants in the earlier strata, while there are plenty of traces of seaweeds; so that it is safe to conclude that plant life was at first aquatic. We may perhaps picture three great epochs.

1. The primeval Open Sea, teeming with small swimming green plants.
2. The floor of the illumined Shallow Sea, with anchored aquatic plants whose descendants varied greatly through ages and ages, some of them having characters that fitted them to live on "dry" land.
3. The beginning of land vegetation descended from salt and fresh water ancestors.

In each age some kinds made themselves more and more at home where they were, while others pushed on to new adventures and conquests. The simplest plants that live an independent life are among the fresh and salt water algæ. Such are the diatoms,

single-celled plants with beautifully sculptured shells of flint, which abound both in fresh and salt water. Such are the tiny plants that form a green coating on the cool and shady side of trees and gate-posts, coming off on your fingers like wet paint.

But many of the seaweeds are very far from simple, and among the brown ones especially we find mimic roots and stems and leaves. The root, however, is only a holdfast, an anchor, and the leaves, or fronds, absorb water with the oxygen and carbon dioxid dissolved in it. In the brown seaweeds there is chlorophyl as in the green ones, but some yellow pigment is added. In the red seaweeds, though one can hardly believe it, there is chlorophyl again, but it is masked by an entirely different red pigment, which may perhaps help the plant to avail itself of the very blue light of moderately deep water.

On the shore the green seaweeds are most abundant in the shallow water, and red ones in the deeper water; the browns, like the bladder-wrack, are in between. Waving about like flags in the water are the great tangles, but we do not see much of them except at the very lowest tides. One of the giant tangles, much burned to yield potash and iodine, has a stem a hundred feet long and fronds of several hundred feet. In actual length these kelp-tangles exceed the height of the Big Trees of California, but they have no strength of tissue; they float in the water, buoyed by numerous gas-bladders.

THE PLANTS THAT FEED ON OTHER PLANTS OR ANIMALS

Parallel to the seaweeds or algæ are what we call the Fungus Family—molds and mildews, mushrooms and toadstools. They are without chlorophyl and cannot live an independent life. Many of them feed on rotting matter; the others prey on living plants or animals. The simplest kind of fungi are the almost ever present bacteria, single-celled plants of very small size, which cause rotting, some kinds of fermentation, and many diseases, such as plague, cholera and tuberculosis. Many of them, however, are useful.

Very interesting are the incrusting lichens which we see on stones and trees, for they are "double plants," consisting of an alga and a fungus living together in a partnership that helps both. The fungus-partners serve to fix and to

shelter; and they absorb the water and salts. The alga-partners have chlorophyl or some allied pigment, and are able to build up carbon compounds. It sometimes happens that the fungus-partners get the upper hand and absorb the algæ, but this means putting an end to their own existence. They cannot continue long without their green allies.

THE PARASITE WHICH FORCES THE GREEN ALGÆ TO BE ITS SLAVE

One of the discoverers of the secret of lichens writes of them very vividly:

The master is a fungus, a parasite which is accustomed to live upon others; its slaves are green algæ, which it has sought out, or indeed caught hold of and compelled into its service. It surrounds them, as a spider its prey, with a fibrous net of narrow meshes, which is gradually converted into an impenetrable covering; but while the spider sucks its prey and leaves it dead, the fungus incites the algæ found in its net to more rapid activity—in deed, to more vigorous increase.

It should be mentioned here that in the lichens it is the fungus-partner that produces the spores, but the algæ enter into the partnership almost from the very first. Lichens may be flat or tufted or hairy; and their colors are often fine. Reindeer-moss, on which reindeer largely depend, is a lichen; and so is Iceland-moss, which is used in making a delicate food for invalids. Another interest of lichens is that they do a good deal in the way of weathering the rocks and beginning the formation of soil on the mountain-tops.

Lichens do not lead on to anything else; and, of course, the molds, mildews and mushrooms and other fungi cannot be considered as leading to the higher plants, for they do not live independently. Therefore, it must be supposed that the next step in the development of plants after the seaweeds, was that which led to liverworts and mosses.

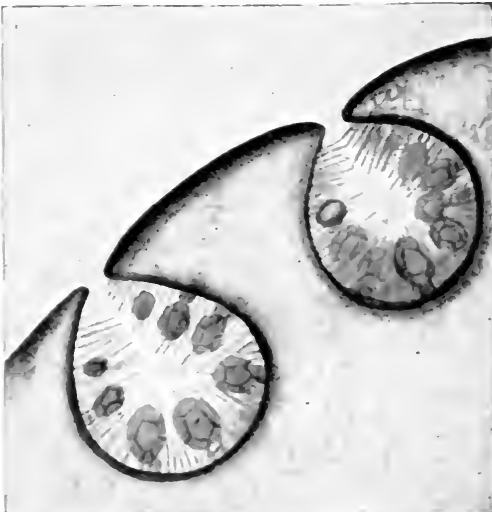
THE MYSTERY IN THE KNOB AT THE END OF THE STALK

Spreading on moist banks of clay, or on the rocks by the side of a waterfall, there are often flat, sprawling green liverworts. Many of them do not get beyond the level of prostrate fronds, but others are divided into lobes, which look like attempts to make leaves. These are often very well ventilated and provided with numerous internal spaces, in which the work of building up carbon compounds goes on effectively, though the light of the places where the liverworts flourish is often very

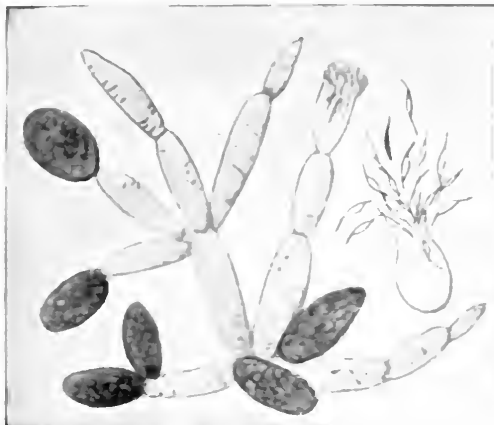
THE LIFE-STORY OF A PIECE OF SEAWEED



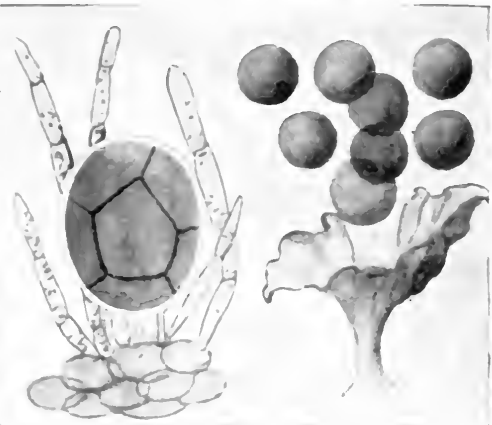
1. This is the common bladder-wrack seaweed of our island coasts. Air bladders enable it to keep floating, and the ends of some of the branches are swollen and have little dimples called conceptacles.



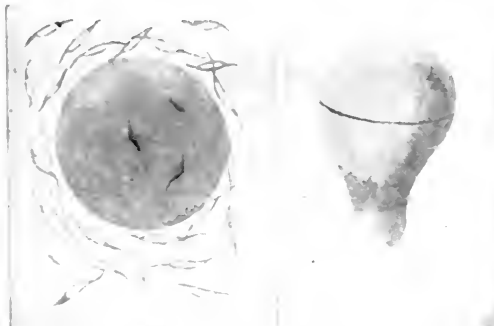
2. This is a section through part of a swollen end, showing two of the dimples. Inside each is a mass of hairs which are the male parts of the seaweed. The globular bodies are the female parts.



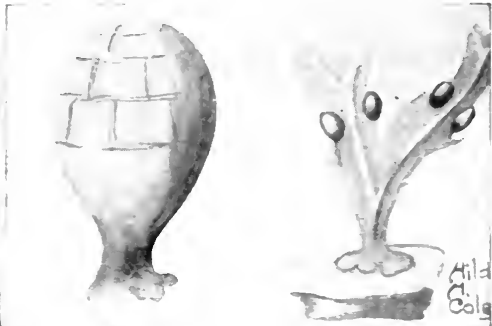
3. The male parts branch out, and the ends swell and become filled with yellow grains. When ripe, the ends burst, and the grains, each with a pair of tiny hairs to help it to move in water, are thrown out.



4. The egg-bearing organ is surrounded by the male hairs. It contains eight little egg-cells, which it discharges into the conceptacle, and then into the sea. On the right the egg-cells are escaping.



5. The egg-cell is now surrounded by the sperms, which blend and form a fertilized egg-cell ready to germinate.



7. The fertilized egg develops into a young seaweed plant, with sucker-like attachments. 8. The young plant now grows and branches, as shown here, and at last becomes a mature plant.

dim. The liverworts make spores inside a knob on the end of a delicate stalk; and these spores, falling on the damp ground or carried away by water, develop into liverworts with male and female organs. The spore-making generation arises, as always, from a fertilized egg-cell.

Fond of moist and shady places, mosses are among the most beautiful of plants. They are very delicate—sometimes like tufts of hair, sometimes like prostrate feathers, sometimes forming spongy cushions, as in the well-known bog-moss. They are what might be called sociable, for if there is one there are many. They soon fill up any suitable place; they multiply quickly, and even a detached fragment can grow into a complete moss. Although they prefer moist places, many of them are able to survive on dry walls or tree-trunks. They can be dried till their leaves are crisp, but a heavy shower puts them right again. They absorb water by their whole green surface, and also by thread-like rootlets that fix them to their station. They form a class of pigmies, but they often show a considerable advance of the liverworts, having short stems and numerous leaves.

HOW THE EGG-CELLS OF THE MOSSES ARE FERTILIZED

If we peer into the top of a vigorous moss plant, we may see the male and female organs, which correspond to the flowers of higher plants. Often the two kinds are on separate plants. The microscopic egg-cell, which lies in the recess of a body shaped like a flask, is fertilized by a swimming male cell, and the fertilized egg develops into a spore-case or capsule borne on the end of a delicate stalk. Thus there are two generations, the ordinary leafy moss plant, which has male and female organs, and then the spore-producing generation. The strange thing is that the second generation grows on the shoulders of the first. When a ripe spore-cell is carried from the burst capsule by wind or water or insect, and lights on a moist place, it grows out into a delicate threadwork, much resembling some of the green algae, and from this there arises the leafy moss plant.

This complicated life-history—spore-bearing plant to egg-bearing plant and then to spore-bearing plant again—is called *alternation of generations*. In one of the cave-mosses, where the light is

very scanty, the threadwork gives out an emerald light. Some of the cells act like reflecting mirrors. The liverworts and mosses are among the simplest land plants of to-day, but there is no reason to believe that they led on to anything higher in the gradual development of the plant kingdom.

It may be that this is the Golden Age of ferns, for there are as many living now as there have been in the past, and far more than in the ancient days of the Carboniferous Era. They are very varied, from delicate filmy ferns, which one might almost mistake for mosses, up to bracken ferns six feet high; from the delicate maidenhair ferns to giants like the royal fern and the tree ferns. There are some seven thousand different kinds, and they range from the tropics to the Arctic. They show a great advance on mosses, for they have numerous vessels for transporting fluid materials within the plant, and the spore-bearing and egg-bearing generations are both of more elaborate structure than in the mosses.

THE LITTLE PLANT MANY PEOPLE HAVE NEVER SEEN

When we look on the under side of the fronds of a fern we see brown spore-making organs, and it is often easy to dust our hand with the minute spores. When a spore of a fern lights on suitable moist soil it develops into a little plant which many people have never seen. This bears the sperm-bearing and egg-bearing reproductive organs, and from its fertilized egg-cell there develops the spore-making fern plant.

In the time when the coal-bearing rocks were being formed (the Carboniferous) the most prominent plants were ferns, horsetails and club-mosses, along with some relatives of these, which are known only as fossils. There was a great vegetation of flowerless spore-plants, and it was from this stock that there arose the seed-plants which by and by conquered the whole world.

FERNS AND MOSSES AS ANCESTORS OF FLOWERING PLANTS

It is a complicated story, and most of the chapters are still unread, but the main thing is that in very early times—probably in the Carboniferous Age—seed-plants arose from the great stock to which ferns, horsetails and club-mosses belong. In the flowering plants that we are familiar with there are two kinds of

spores just as there are in water-ferns and some club-mosses—one kind of spore is represented by the young pollen-grains produced by the spore-making organs we call *stamens*; and the other kind of spore is formed inside the spore-making organs we call *ovules*, and develops into a structure called the embryo-sac, which contains the egg-cell.

But the pollen-grain commonly contains, when ripe, three cells, and that is all that is left of the male generation. These three cells pass down the pollen tube which grows from the pollen-grain when it is landed by wind or insect or otherwise on the tip of the pistil; and one of the three, a sperm-cell, reaches the egg-cell inside the embryo-sac and fertilizes it, so that a young plant begins to develop. It is interesting that in cycads, and in the maidenhair tree, the fertilizing male cells should still be free-swimmers with many lashes, resembling the free-swimming male cells of the great fern alliance.

THE EMBRYO AS THE GRANDCHILD OF THE PLANT IT GROWS ON

Turning to the other side of the flower, we find that the space in the ovule produces a structure called an embryo-sac. This comes to have eight cells and one of the eight is the egg-cell. After it is fertilized by the sperm-cell, it develops into a young embryo plant in an ovule. The embryo plant and the surrounding parts of the ovule together constitute a seed. But, as Dr. MacGregor Skene says in his delightful book on Common Plants, "the embryo is not the child of the plant on which it grows, by which, in the early stages of its life, it is nourished; it is the grandchild. Between the two there is an intermediate generation, reduced to a few cells, never having an independent existence, but still recognizable." All this is difficult, but it is worth puzzling over.

THE SEEDS THAT DRIFT ABOUT IN THE WIND

The young plant gets a good send-off in life. While the ancient spore-plants were spread abroad by spores, their successors, the seed-plants, are spread abroad by seeds; and this is the surer way. In the geological Middle Ages (called the Mesozoic) there was a great wealth of cycad-like plants, along with their predecessors—the ferns, horsetails, club-mosses, and the now extinct relatives of these.

The cycads, the maidenhair trees, and the conifers are true seed-plants, but they do not quite rise to the level of flowering plants. In a pine tree the female cones bear on the upper surface of each scale two ovules which are quite naked. In early summer these scales open, and the pollen-grains—each of which has two air-bladders, or floats—are drifted by the wind and caught in a drop of sticky fluid on the tip of the exposed ovule. It is not till the next summer that the fertilization of the egg-cell takes place, and it is not till the third year that the winged seeds are liberated and borne about by the winds.

The true flowering plants are divided into two great classes, the Dicotyledons, with two seed-leaves (cotyledons)—such as buttercups, chickweeds, roses and daisies; and the Monocotyledons, with one seed leaf—such as the lily and the daffodil, the orchid and the grass.

AN INTERESTING CENSUS OF THE VEGETABLE KINGDOM

Now, in the monocotyledons the leaves usually show a number of large strands joined by delicate cross-connections; in dicotyledons the strands or bundles usually form a more noticeable network. The stem of a dicotyledon can go on growing in thickness indefinitely, but in most monocotyledons the stem does not increase in diameter after it is formed. Everyone is familiar with the tapering stem of an ordinary dicotyledonous tree, and the cylindrical stem of a monocotyledonous tree such as a palm. Finally the parts of the flower in monocotyledons are usually in threes, while the others are usually in fours or fives.

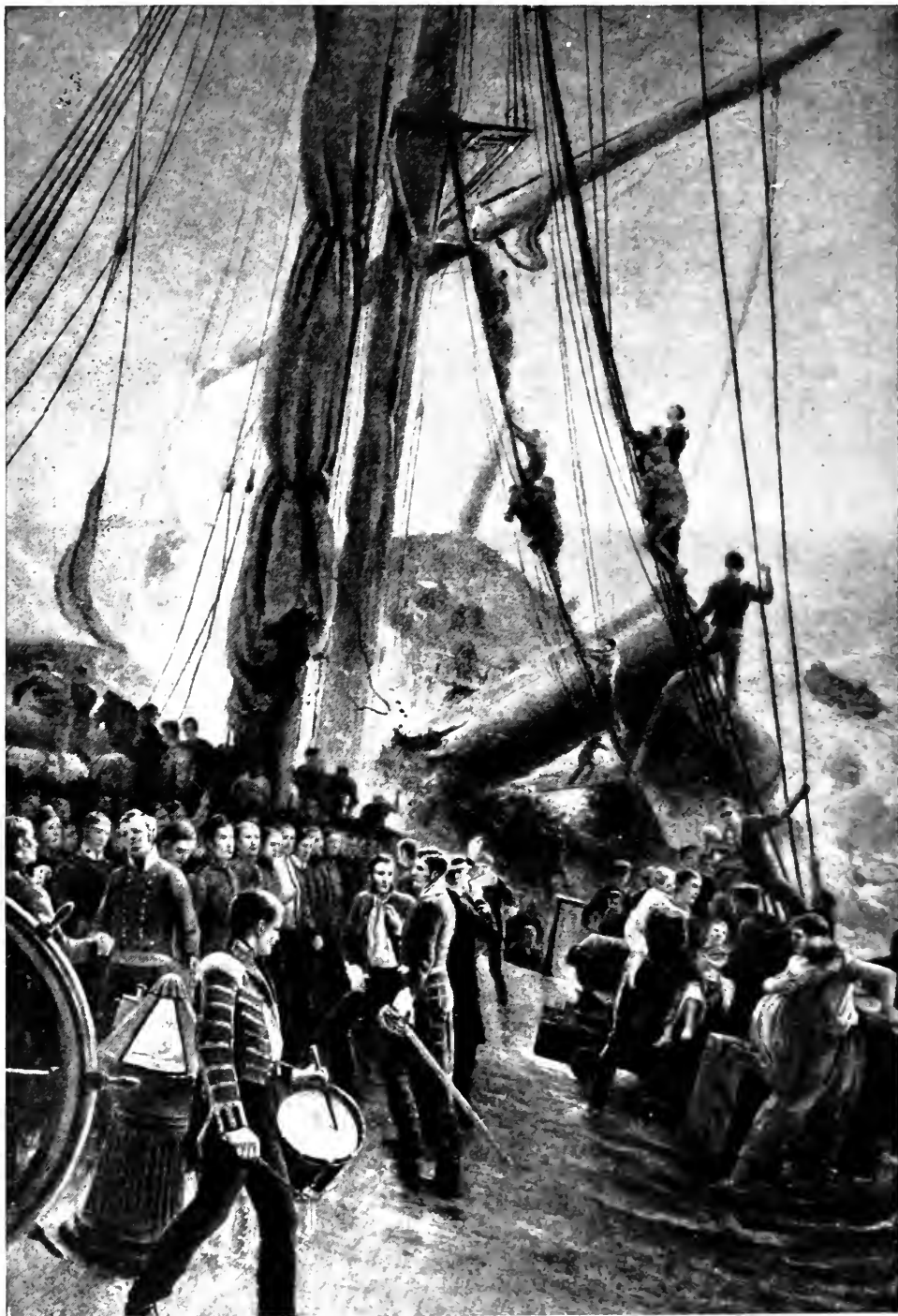
It may be of interest to notice a census of the vegetable kingdom taken by Professor Vines in 1900.

Group	Kinds
True Flowering Plants	103,000
Fungi and Bacteria	40,000
Seaweeds or Algæ	14,000
Mosses and Liverworts	7,500
Lichens	5,500
Flowerless Plants with vessels	3,500
Naked-seeded Plants	2,500
Total	176,000

The large number of parasite plants is striking; but the greatest fact is that the flowering plants, with their very great care for the young, have been the great conquerors of the plant world.

THE NEXT STORY OF PLANT LIFE IS ON PAGE 1013.

HOW THE BIRKENHEAD WENT DOWN



This powerful picture, by Thomas M. Hemy, brings before us vividly the scene on board the troopship Birkenhead when it crashed into a sunken rock in Simon's Bay, South Africa, on a February night in 1852. The soldiers fell in as if on parade, and some were told off to help the sailors to assist the women and children into the boats. Thus 184 were saved, but there was no room for more, and, sooner than risk overcrowding the boats, 454 British soldiers and sailors stood in line and went down with the sinking ship. "Birkenhead" is inscribed on the flags of the regiments who thus met death so courageously.

This picture, illustrating the story on page 885, is reproduced by permission of Messrs. Graves & Co., the publishers.



THE RACE FROM MARATHON

"REJOICE, we conquer!"

Gasping out these words as joyfully as his parched tongue can utter them, a poor worn-out youth drops lifeless into the arms of those Athenians who have hurried out of their city to learn his tidings. His faint whisper goes from mouth to mouth, and is passed on throughout an anxious city, quickening the pulses of the citizens until they lose themselves in an outburst of thanksgiving and rejoicing.

The story of this victory is one of the most thrilling the world has ever known. It takes us back over 2,000 years to one of the first decisive battles in the world's history. Darius, the Mede, has made himself master of Asia, and, angry at interference on the part of some little Greek state, he assembles his picked soldiers, summons the various tribes who own his sway, and sails over the Ægean Sea to conquer and enthrall those little Greek states of whose skill in peace and war reports have reached him.

Athens is the first large city in the path of his hitherto unconquered hosts, and the Athenians feel the need of aid from the famous Spartans, whose state lies 120 miles to the south across the Isthmus of Corinth. The army of the Medes and Persians is fast approaching, and their city will soon be invested. How are the Spartans to arrive in time? The rulers of Athens, seated in grave council on the Acropolis, send for Pheidippides, their cham-

pion runner, who has won for his state the myrtle crown at the famous Olympic

games held by the Greek states every five years. They command him to run and urge Sparta to come to their aid. And for

two days and two nights Pheidippides runs, swimming the rivers and climbing the mountains in his path.

But the Spartans are envious and mistrustful of Athens. Though brave and fearless, they lack intelligence; and, besides, they were a very superstitious people, and so Pheidippides is sent hurrying back with the news that their army will come, but cannot start until the full moon.

Pheidippides races back to Athens again. The Athenians have now been thrown on their own resources. The Persians have landed and the Athenians resolve to oppose them at once. The weary but dauntless Pheidippides takes his long spear and his heavy shield, and marches with the 10,000 picked men to meet the foe. We read on page 914 of the famous battle of Marathon and how these 10,000 Greeks drove back hundreds of thousands of Medes and Persians;—but this story is of Pheidippides.

With Marathon fought and won, the victorious Greeks call to Pheidippides to take the news to the capital. Flinging down his shield, he runs over hill and valley the twenty-six miles to Athens. There sinking into the arms of friends, and gasping, "Rejoice, we conquer!" the gallant runner dies.

THE MEN OF THE BIRKENHEAD

NOT very many years ago the steamer Birkenhead was on her way from England to South Africa. On board were the crew and a contingent of soldiers with some of their wives and children. They were being sent to the colony to form part of the permanent garrison of the country, to insure its protection and safety.

The great ship steamed along the coast of Africa, no one dreaming of danger. It was night, and all but the sailors who had to work the ship were sleeping. Suddenly her side crashed against a sunken rock. Everyone hurried on deck, for all knew from the shock that some great disaster had happened. But there was no panic. The officers gave orders, and the men obeyed as steadily as if they had been on the parade-ground. The soldiers were set to help the sailors, working at the pumps to keep the ship from sinking, and getting the horses overboard to lighten her. That must have been a sore task for men who loved the poor horses, but it could not be helped. And still the water came in, and everyone knew the Birkenhead must go down.

Then they set about launching the boats. The sea had not been dangerous for the big ship when she was whole, but it was too rough for small boats. One

big boat and two small ones were filled with women and children and pushed off safely; another was smashed by a falling spar; two were swamped before anyone could be got into them. Then the ship broke in two, and one half began to sink.

The soldiers were already drawn up in ranks. The captain called to them to swim for the boats; but the colonel saw that if they did, the boats would be over-filled and swamped. The men stood firm, awaiting their officer's order. He told them that if they swam for the boats, these would be capsized, and the women and children drowned.

So they stood in their lines, waiting for the ship to go down, as steady as if they were on the drill-ground. Then the hungry waves washed over the decks, and the brave soldiers were plunged into the sea. All they could hope for was to keep afloat till the boats reached the shore and could return to pick them up. A very few managed to swim ashore by themselves. A few held on to the wreck, and these were picked up the next morning by a passing vessel, which had also rescued the people in the boats unable to reach the shore. But the greater number perished, heroes no less than if they had fallen on the field of battle.

THE SWISS GUARDS WHO DID THEIR DUTY

THE Swiss have often been noted for brave deeds, but one of those we like to think about most was done by Swiss soldiers far away from their own beautiful country, in Paris, in 1792, the year of the Revolution.

The French kings had learned to rely on the Swiss, and had formed a guard of honor of trusty yeomen from Lucerne and other cantons, and called it "Les Gardes du Roi."

When the mob stormed the Tuileries Palace, where the royal family were, on August 10, 1792, the Swiss Guards stood firm defending King Louis XVI and his queen, so that the men who were thirsting for their blood could reach them only over the bodies of the Swiss. One after another the soldiers were massacred, fighting bravely till two battalions were overcome; and when the rest fell, on September 2 and September 3, the Swiss Guards were almost wiped out.

The great Danish sculptor Thorwaldsen designed a beautiful memorial for the Swiss Guards, which has been sculptured out of the natural rock in the Glacier Garden at Lucerne. It represents a wounded lion pierced by a broken weapon, defending with its paw, as it lies dying, a shield bearing the fleur-de-lis of France. On the rock over the lion's head we read: "Helvetiorum fidei ac virtuti," a Latin inscription which means "To the fidelity and courage of the Swiss." Then the names are given of those who were not false to the oath of fidelity—officers and men who fell not in defense of their own country, but simply in devotion to a foreign king.

If you ever go to Lucerne, be sure to see the lion, for it is a touching monument to loyalty, carved in the Alps of the men's native land. It is over a hundred years since they fell, but their memory is still dear in the land of their birth.

A FRUGAL HERO OF ANCIENT ROME

ROME became a great power because her citizens were honest, single-minded men who worked hard, loved their country, governed it wisely and fought for it bravely. In its early days the little state was surrounded by enemies,

in their valleys high among the rugged Apennines. Humble by birth, he had won the esteem of his fellow-countrymen so that they three times elected him to the consulship, the highest office of the state, and twice gave him a triumph—a great honor for a Roman.

But when the fighting was over, Dentatus would go back to his farm, and work there with his own laborers in the fields until his country called for him again; for he was a man of sturdy, self-respecting character, living a simple country life. For him luxury and ease had no attraction.

It is said that the Samnites once sent messengers to him with valuable presents of gold in the hope of bribing him over to their side. They found him seated beside his hearth cooking a meal of turnips in an earthen pan. When Dentatus saw the gold, he refused it with contemptuous laughter, saying that he would rather rule over those who lived in plenty than to be a possessor of wealth himself, and that he was neither to be overcome in battle nor bribed by money. So the Samnites, shame-faced, had to

take back the presents they had brought.

It was men of this type who built up the great Roman Empire, for they first learned the secret of ruling themselves and put honor before wealth. In their hands the state was safe; but when love of gain and pleasure became the heart's desire of the Romans, their empire could stand no longer.



Curius Dentatus refusing a bribe in Rome.

and men would be called from their farms outside the city to defend it against the Volscians, the Samnites, and other peoples who were their neighbors in the narrow peninsula of Italy.

One of the bravest of the early Romans was the farmer-statesman Manius Curius Dentatus, who fought against Pyrrhus and was also victorious over the Samnites

THE GIRL WHO SAW THE TSAR

ABOUT a hundred years ago a Russian officer offended the Tsar, and was banished with a number of other exiles to a cold and dreary place in the north of Siberia. The prisoners went through all manner of hardships, but this Russian officer was allowed to take with him his wife and little daughter Prascovia; so that he was saved the agony of separation from them.

Life to the exile in Siberia was a rough and hard one, and, as the years went by, and hope of pardon grew less and less, it was sad for the parents to watch their little daughter growing a big, untaught girl in such rough surroundings. Seeing her father so unhappy, Prascovia was unhappy, too; and then one day, when she was nearly fifteen years old, the idea flashed into her mind that she ought to go to Petrograd and beg the Tsar to pardon her father.

Could she do it? To walk all those dreary hundreds and hundreds of miles to Russia! Would her father and mother consent to let her try? Anxiously, with beating heart, she told her father what it was in her mind to do. But he only smiled at the idea of his young daughter venturing on such a mad errand.

THE LONG JOURNEY WHICH BEGAN AFTER A LONG, LONG WAITING

Three years went by, and little Prascovia was growing helpful and womanly. She had never forgotten her cherished plan, and she put it before her father again. This time her father and mother listened to her, but begged her not to think of leaving them for such a dangerous venture. But Prascovia got another exile to write a request for a passport, and in six months that passport had reached her.

Now that the way was open, Prascovia's father tried to dissuade her from starting. How could she, a penniless, unknown girl, gain access to the Tsar, even if she braved the dangers of the journey? But Prascovia put her trust in God, knelt to receive her parents' blessing, kissed them, and, with just one ruble in her pocket, started on her long walk through the forest. Her parents went with her a little way to the town near, where she had friends who gave her a bed the first night; but the next day

her lonely tramp began. On and on through the miles of forests, over rough roads and across rivers, Prascovia plodded, sometimes losing her way, sometimes getting soaked with rain, often weak with hunger and spent with exhaustion. At times she met with kindness, was made welcome at a cottage or got a lift in a cart; at other times she was roughly ordered away or hooted by village boys.

THE SORROWS OF THE LONG WALK TO PETROGRAD

In one cottage where she spent a night the people seemed so unfriendly and suspicious that Prascovia was afraid they meant her ill, especially when, thinking her asleep, they searched her clothing. But they were merely curious.

As winter came on and snow fell, Prascovia's misery increased, and she was often hindered by the snow-drifts. When in a barge on the Volga, she was pushed into the water by accident and as a result fell ill; but some good nuns nursed her till she was well again.

At last Prascovia, much to her joy, reached Petrograd. A kind lady interested herself in the girl and took care of her until an opportunity came to present her petition to the mother of the Tsar. This lady was touched with the story Prascovia told her, and promised to take her to the Tsar.

Now the way was clear, and two days later Prascovia was in the presence of the Tsar. To her relief he received her kindly, promised inquiry into her father's trial, and gave her five thousand rubles. The grateful girl poured forth her thanks and blessings on the Tsar.

THE PARDON FOR WHICH A BRAVE GIRL PAID WITH HER HEALTH

And so Prascovia got the pardon for her father, and when the Tsar asked if there was anything she wanted for herself, she begged for a like act of mercy for two friends of her father who were also in exile.

Prascovia soon set out to meet her parents on their way home from Siberia, and joyful indeed was the meeting; but the poor girl never really recovered from the hardships of her long journey, and she was an invalid during the rest of her life.

THE NEXT STORY OF GOLDEN DEEDS IS ON PAGE 1035.

THINGS TO MAKE AND THINGS TO DO



Boys and girls at work making wood furniture.

LOUISE BRIGHAM AND BOX FURNITURE

THE boys and girls who are going to learn to make box furniture will want to know something about Miss Louise Brigham, the woman who invented it, and so I am going to tell you briefly how the idea grew from a tiny acorn to a stalwart oak.

Miss Brigham is a Boston girl, thrifty by nature. As a child she loved to do things with her hands, and made useful and pretty things out of the scraps that were given her. Her special delight was to keep things in order; her dolls' trunk and her bureau drawers were so systematically arranged that there was a place for everything and everything was in its place. You will wonder what this has to do with box furniture. It was this sense of thrift and order that enabled her to see the great possibilities of the ordinary box which comes from the grocer.

The box has taught her many things. Its shape (the oblong or the cube) is one of the fundamental forms in art, and so, instead of concealing it, Miss Brigham made it the foundation of her designs, and has always kept it. She combined boxes in good proportion, she removed box covers, or a box side, according to the design, but she always kept before her the beauty of the straight lines that composed it. If the reader will bear this idea in mind while making box furniture according to the instructions, carefully studying the accompanying illustrations, he will see that while the furniture is beautiful, the idea of the box is never lost. If we get at the ideal back of the form in any work we do in life, we shall learn more quickly and thoroughly than if we merely follow a diagram or set of instructions.



Boys taking discarded boxes into the workshop to be made into box furniture.

Miss Brigham wished, above all things, to help her fellow-men, and experience taught her that the best way to do that was to help them to help themselves. By choice she lived in the most crowded foreign district of Cleveland, and so happy was the influence of her little home that it was known as the "Sunshine Cottage," and its mistress was lovingly nicknamed "Queen Louise." It was in Sunshine Cottage that the idea of box furniture was born, and the idea spread to many countries.

Miss Brigham had noticed that many things in homes were thrown away as useless, simply because no one had thought out what to do with them. If a soap box was used for "spill over" things, the majority of people covered the box with something to conceal it. It never occurred to anybody to see beauty in a soap box, or the possibility of making it into something else.

But the inventor of box furniture proved that discarded boxes and crates could be made beautiful as well as useful, and that an artistic home was possible, no matter how humble. If she happened on a family that could not afford a high chair for baby, she manufactured one with her own skillful hands, from discarded boxes, that was more durable and better looking than any to be found in the shops. She taught fathers and mothers, boys and girls to make things for themselves.

Thus she had already made some experiments in the making of box furniture when she went to camp on the island of Spitzbergen. The camp was in a spot about seven hundred miles north of the Arctic Circle; the port of Hammerfest, in Norway, was the nearest point

from which supplies could be obtained, and Hammerfest was 535 miles distant. During the long eight months of winter even this place could not be reached, and the islanders were shut off completely from the world. All their food and clothing and the needful implements for working the coal mines on the island had to be brought across from the mainland during the short summer months. New settlers in Spitzbergen would have to go in summer time in order to get the camp fixed up ready for the winter.

As soon as the portable house which was to serve as camp for Miss Brigham and her hosts had been set up, they unpacked their supplies and found that they had numbers of empty boxes. These boxes were the only lumber on the island, for no trees—except a dwarf willow which creeps along in favored spots—will grow in that climate. Yet there was no place to store it and no immediate use for it. Miss Brigham saw her opportunity and begged that she might have the “odds and ends” to carry out her ideas in box furnishings.

A work bench was set up and the work began. Every day the interest in the boxes grew, and the

When she returned to New York, Miss Brigham moved a cartload of cast-off boxes into an empty apartment and proceeded to build her home around her. The boys in the neighborhood begged to help her that they, too, might learn to make furniture. This little home drew crowds of visitors, and a second and third apartment followed. They were called Box Corner First, Second, Third. The furniture for the last apartment was entirely made by the neighborhood boys as an expression of gratitude to Miss Brigham for all she had taught them.

By and by an exhibition called the Child Welfare Exhibit was held in New York by good people who were trying to see that all possible happiness should be brought into the lives of the children who live in the crowded parts of this great city. A room furnished with box furniture formed part of this exhibition, and the simple, artistic furniture attracted so much attention that the result was the formation of the Home Thrift Association, with Miss Brigham as director. The City of New York gave her the free use of the ground floor of the old Gracie Mansion in Carl Schurz Park for



The load of empty boxes has been transformed into box furniture to take home to father and mother or little brother or sister. All of these have been made from ordinary boxes, often thrown away.

Danish peasants who gathered round made guesses as to what this new one was going to be. In that region of midnight sun there are long hours of light, and the plans could be carried to a finish while enthusiasm was keen. It may happen that boys and girls who will make box furniture, when they have studied about it, cannot carry out their plan so quickly. Perhaps they have only a few spare hours from lessons to give to it, or the winter evening is short and it is “so soon time to go to bed!” Nevertheless, if they have patience to put up with delays and pick up their work just for a short time, they will often find that in the interval a new thought has come to them which helps the work. When the furniture was finished, it was used to furnish the little cottage—to the great delight of the “carpenter’s” hosts.

The Walter Wellman exploring expedition was in that region during that summer, exploring the polar areas to the north of Spitzbergen. Their base was on Danes Island, a hundred miles nearer the Pole, but on one occasion members of the party landed in Spitzbergen to pay a friendly visit. As soon as they saw the comfortable little cottage, with its attractive box furniture, one of the explorers said: “You have the northernmost civilized home in the world.”

workshops for boys and girls, but the work of this association grew so rapidly that it was necessary to take an entire house where the work could grow without cramping. Here boys and girls learned to transform waste material into artistic furniture and home decoration of every kind. The work soon proved itself to be of so much value to the children that at the Panama Exposition in 1915 Miss Brigham was given enough free space to furnish a house of seven rooms, so that many others might learn how to make it.

So many demands were made for furniture made from box-furniture designs that a company was formed to manufacture furniture in good wood from Miss Brigham’s designs. The fame of the box furniture spread far and wide, and a flourishing business has grown out of the ideas which a young girl first used to teach her poorer neighbors that economy and a love of beauty can go hand in hand. Although box furniture is now made in beautiful woods, she still keeps in her studio the original furniture made by her boys from boxes, a reminder of the happy days when she first inspired them to use their hands and minds.

In the following pages, and elsewhere in this book, you will find directions for making some box furniture. Other ideas will come to you as you

work, and you may have the pleasure of helping to beautify your summer camp or home in the country, or your own room in the city; or you may have the joy of giving some of your own work to your friends. There are few pleasures greater than giving something you have made, as well as something useful and beautiful.

Where space has to be considered, you will find

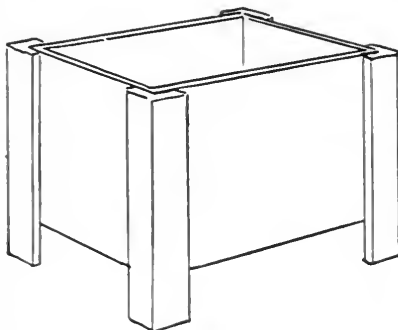
that articles of furniture made from boxes will be warmly welcomed, for really this furniture seems to take up less room than does ordinary furniture. If you have a small bedroom you will be surprised at the air of comfort a few articles made from simple boxes will give without crowding you into the hall. When you have made one article you will see how true that is.

HOW TO MAKE BOX FURNITURE

DO you know the possibilities of a soap box, just an ordinary soap box which the grocery boy will gladly give you, or the shopkeeper will sell for a few pennies? A plain everyday soap box may be converted by magic into an attractive piece of furniture which is both useful and practical. This is not a stage trick to amuse an audience, but an actual bit of carpentry of great value. It is possible to transform humble and discarded material into objects which prove worth while in the home, especially where space is limited. By actual experiment the summer cottage, the city home and even the classroom can be fitted up at very small expense.

Do you love to tackle a hammer and saw, and tinker around making things for yourself? Would you like to know how to make something you have never made before? And would you like to have in your room some special pieces of furniture which you have made yourself? Usually when we buy furniture that is striking or new or unique, we find that it is very expensive. There is nothing commonplace about box furniture, and yet it is surprisingly inexpensive.

The materials necessary are: a wide-awake boy or girl, a box, a few tools, and a spare hour or two. There are boxes and boxes, yet each box has its possibilities: salt box, candle box, soap box, packing box, tea box, canned-soup box, shoe box, and a host of others. Keep your eyes open for boxes, for there is a use for each and every one. Are you ready with a box and tools?



A small plant box.

What do we need to know before beginning?

Box furniture is so easy to make when we know how, that a few general directions before beginning will help us in making all the articles. The old motto, "Make haste slowly," will be a good one to follow in our work. First, we must find out what we are going to make, what tools and what materials we need, and then go ahead.

What kind of box do we need?

When we are asked to get a certain kind of box, it means a box about that size is necessary, but a box with another name of nearly the same dimensions will do just as well. We must try to select the best box we can find, for the way the finished article will look depends very much upon the condition of the box we use. Do not use a box which has large knot-holes, or which has a name or advertisement branded deep upon its surface,

or which is marred and split. Some boxes are now made having "dovetailed" corners. These are not satisfactory, if the directions say that a side or an end is to be removed.

How large a box shall we select?

We must use our own judgment in selecting the size, although the directions give the proper proportions which we must observe. For instance, if we are making a bookcase, and have a space in the room of 40 inches to fill, do not try to make a bookcase which is 42 inches wide. The size of the box means the actual outside measurement of the box suggested. Try to follow the directions closely, so that the work will look well.

How are the legs made?

The legs, or corner trim, as we sometimes say, are always made the same way in all the articles.

They are easy to make, for they are made of one narrow and one wider strip joined together to form a right angle. When the pieces are nailed together each side of the angle will measure just the same. In joining them use finishing nails or large brads $1\frac{1}{2}$ inches long, driven about 3 or 4 inches apart. To make them hold better, use a little glue before nailing them.

What kind of nails do we need?

How are they used?

It is well to have on hand a quantity of nails when beginning your work. Besides the common nails with regular heads, you will need some finishing nails, the kind used by the carpenter for fine work, when the nails should be as nearly invisible as possible. The smaller finishing nails are called brads or sprigs, and range in size from $\frac{3}{8}$ inch to $1\frac{1}{2}$ inches, and are so made that they may be driven almost out of sight without danger of splitting the wood. When nailing together the various parts, drive the nails so that their points will be hidden, and drive the heads a little below the surface so they will not show. In joining boxes, the nails are driven from the inside of one box through its side (or end, as the case may be), into and through the adjoining box. Use nails of the proper length to project $\frac{1}{8}$ inch or more inside of the latter box, where the points may be bent over at a right angle, which is called "clinch the nail." Avoid much clinching if you wish the work to look neat. In attaching the legs, screws may be used. In some cases the screws are less apt to split the wood than are the nails.

The designs and outlines described are taken, by permission of the publishers, from Miss Brigham's book, *Box Furniture*, copyright, 1909, by the Century Company.

How is the box to be finished?

Fill any nail-holes or other defects with a mixture of putty and sawdust. We add a little sawdust to the putty, as pure putty will not absorb the stain. A few sheets of sandpaper. Number 0, 1½ and 2 will be needed to smooth the surface.

How shall we apply the stain?

Be sure the surface is dry and clean, and the rough places all sandpapered. If the article is made of soft wood, there will be more flaws than if hard wood were used. Look after any dents, bruises or cracks, and press a little putty with a pliable knife into the holes before painting or staining. Now apply a first, or priming, coat to the wood, using a small brush and working it backward and forward across the grain. Let this coat get thoroughly dry before applying the next. Let it stand overnight, or even forty-eight hours if the weather is damp or muggy, and then sandpaper it a little and apply the next coat.

What tools do we need?

Before beginning to work, be sure your tools are ready and in good condition. It is better to have a few sharp tools, rather than a child's tool-chest or a large collection of cheap tools. Here are the tools that we need: a large hammer with a good claw, an iron-handled screwdriver, an iron jackplane, a square, a rule, a good saw (a rip saw is useful, too, but not necessary), and an iron vise screw for the work-bench. Any boy who has a good set of tools comprising the seven mentioned and a big jack-knife, which every boy owns, is well equipped for the work. Take good care of your tools; never leave them lying about, and do not let them get damp.

A MINIATURE PLANT BOX

WHEN spring comes, father and the boys are busy planting seeds, and how we wish we could put some seeds in the earth, too! If we are going to have a wee garden of our own in the summer, it is well to plant the seeds early. This plant box we are going to make can be used for our early seeds.

Materials needed.

We need one salt box, or any box that is about 5 inches deep and 6 or 7 inches square. For the legs we must have four strips ¼ inch thick, ¾ inch wide and 1½ inches longer than the height of the box, and four more strips ¼ inch thick, 1 inch wide and 1½ inches longer than the height of the box.

How to make the plant box.

Take the cover off the box, and plane the sides in case they are rough. Then trim off the three sides at the top of the box which contain the grooves that hold the cover.

To make the legs, join one narrow and one wider strip together, and nail them so that each side of the angle measures alike. In joining them together, use small finishing nails ¾ inch long, driven about 1½ or 2 inches apart. Make the legs 1 inch longer than the height of the box after it has been trimmed. To make the parts hold more firmly, use a little glue before nailing.

Place a leg at one corner, keeping the top of the leg even with the top of the box. Place a string around it and the box to hold it until you have nailed it firmly. Use nails about 1 inch long. Carefully sandpaper the box and fill imperfections with putty, and stain or paint it any color you desire.

ANSWERS TO LITTLE PROBLEMS ON PAGE 751

By 8:30 Alfred has walked one-fourth of the way, and in another 5 minutes he has walked one-third of the way. The difference between one-third and one-fourth is one-twelfth, so that he walks one-twelfth of the distance in 5 minutes. At 8:30 he has still three-fourths, or nine-twelfths, of the distance to go, and this will take him 9 times 5 minutes, or three-fourths of an hour. He therefore arrives at school at 9:15.

From noon on Monday to 8 o'clock on Wednesday morning is 44 hours. His father's watch, therefore, lost 3 minutes in 44 hours. But it was right when it had lost only 2 minutes, which it would do in two-thirds of 44 hours—that is, in 29 hours 20 minutes. This number of hours from noon on Monday would make it 5:20 on Tuesday afternoon.

Fred and Albert crossed the ferry first, and Fred brought back the boat. Then the father crossed alone, and Albert returned with the boat. The boys again crossed together; and Fred brought back the boat in which the postman crossed alone. Albert then rowed across to the starting shore, and brought back his brother.

The hare makes 3 leaps while the hound makes 2, so that she makes 9 while the hound makes 6. But the hound goes as far in these 6 leaps as the hare does in 14, so that the hare loses a distance equal to 5 of her own leaps in every 6 leaps the hound takes. She will therefore lose 60 leaps while the hound takes 72—that is, the hound catches her when he has made 72 leaps.

This is what is usually known as a "catch"; and the answer is that, as they stood, they faced each other, one looking north and the other south.

One-third of the seats were filled at 50 cents each. At 25 cents each two-thirds would have yielded the same amount. Therefore, had the hall been filled, the remaining third would have yielded \$50, so that there were 200 in that third, or 600 seats in the hall altogether.

If we divide 60 minutes by the number of trains an hour, we get the number of minutes between each train. If there were 3 more trains per hour there would be 1 minute less between each train. We therefore have to find two numbers whose difference is 3, and which, when divided into 60, give results which differ by 1. The numbers which divide 60 are 2, 3, 4, 5, 6, 10, 12, 15, 20, 30. First, those which differ by 3, are 2, 5; 3, 6; and 12, 15. Of these, the pair which give results differing by 1 when divided into 60 is 12, 15. Hence there were 12 trains an hour, which is a train every 5 minutes. The passenger waited 4 minutes.

6,000 tons. It is plain that 160 tons is the difference between three barge-loads and one barge-load, so that each barge held 80 tons. And there were 75 barge-loads in the cargo, so that the total was eighty times 75 tons—that is, 6,000 tons.

Three ducks.

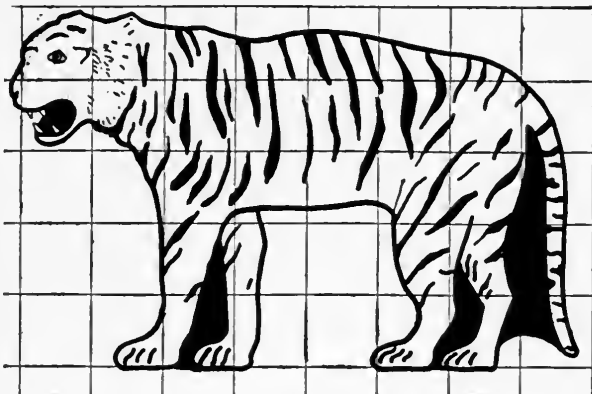
THREE MORE ANIMAL TOYS FOR YOU TO MAKE

HERE are three additional suggestions in animal toys which may be made to match those you have. If you prefer, you may make these with joints or mount them on wheels. You will find that the tiger, the buffalo and the lion are almost as easily made as the bear, the wolf and the hippo, for which directions were given on page 511. These three wild-animal toys may also be made from cigar boxes or other thin soft wood. Perhaps you will need to be even a little more careful in placing the patterns of these animals on the wood in such a manner that you may avoid short-grain, as you will see how easily parts of their tails and feet might otherwise be broken off while you are shaping them.

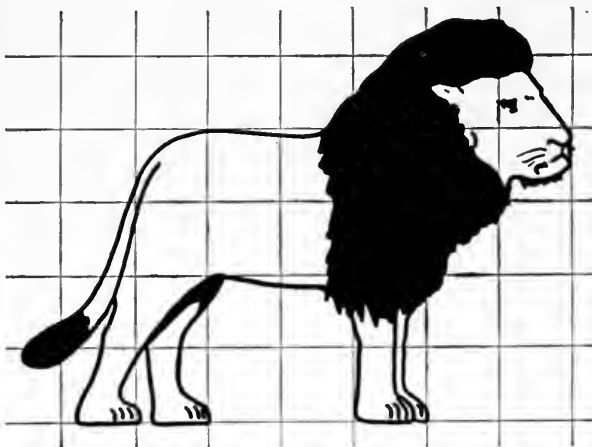
First make each one of your patterns either by laying out your sheets in inch squares and then sketching in the outlines as was previously suggested for the bear, the wolf and the hippo, or note the general proportions of the animals and draw the outlines free hand. Then, too, you may wish to change some of the proportions slightly if you find that you wish a larger or smaller tiger, buffalo or lion. If you prefer to make your drawing on the wood, you will not need any patterns. Some children report that they find it easier not to sketch the animal at all, but to trace patterns from books or toys which they have at home. Where pictures are

traced from books, the tracing paper is laid over the animal which is to be copied. After the outline has been carefully traced, it is then transferred to the wood from which the animal is to be made. If the copy is to be made from an old toy, it should be laid flat on the wood and its outline neatly drawn with a sharp-pointed pencil. In any case, you are now ready to cut out the tiger or other animal by following the outline with a saw or a knife. If you find it too difficult to cut the tail of any one of these animals from wood, you may use heavy twine or small rope which can be fastened with either nails or glue.

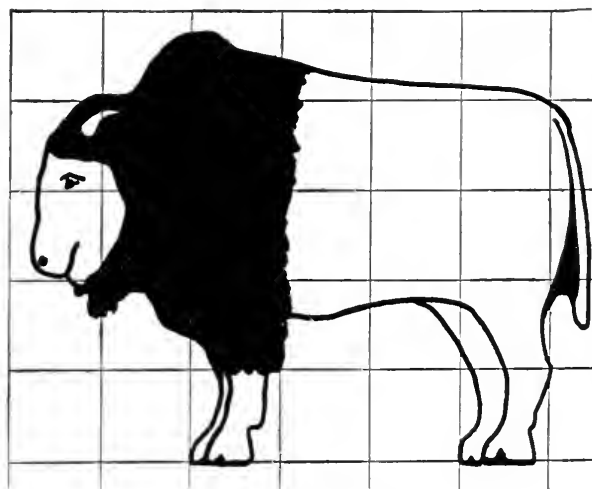
Some children have made the legs of their animals in separate pieces in order that these would appear more life-like. In making such jointed toy animals, it is necessary to fasten the legs to the bodies with small-headed nails or brads. Before doing this, however, one must decide upon the most suitable location of each joint of the animal. By using the pattern which has been made for the toy tiger, for example, new patterns are easily drawn for the body and the legs. These are next cut from the thin wood. Of course, it will be understood that the legs will need to be made considerably longer than the original pattern because of the overlapping of the legs informing the joints with the body. As soon as these parts have been cut from



1. Tiger cut from thin wood.



2. The African lion.



3. Buffalo cut from wood.

the wood, the corresponding legs (two hind or two fore) are placed in position on either side of the body, and small holes are made with an awl or other sharp-pointed tool to prevent the wood from splitting. A wire brad or small headed nail, slightly longer than the three thicknesses of wood, is then driven through and riveted by hammering the point with the head resting against an iron surface. This pivots the tiger's legs so that he can be made either to stand or sit.

Now, unjointed or jointed, as the case may be, you are ready to paint the tiger his natural color. Do not forget his black stripes, his green eyes, and his bright yellow coloring, for he is very proud of all of these markings. What colors should be chosen for the buffalo and lion? Later we shall suggest that you make a Noah's Ark or a circus wagon in which to keep these prize animals, as you cannot afford to lose even one of your valued menagerie.

HOW THE LADIES CUT THE CARPET

THESE drawings show four ways in which the Japanese ladies might cut up their carpet according to the problem stated on page 751.

In the first three drawings the carpet is divided into four pieces, and of these one sister has a large whole square; another, two parts (marked A, A in the drawing) which together make a whole square; and the third sister has a small whole square. If you take a thin piece of paper, you can trace the lines in the drawings, and cut out the pieces. In the second drawing there are a large whole square, a small whole square, and two parts (A, A) which, put together, make a complete square. In the third drawing you will again find that the two parts A, A make a whole square.

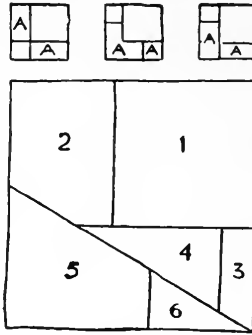
Now, supposing the carpet to measure 9 feet square, draw a square and divide the sides each into nine parts. Make a square on a side containing six of these parts. This square

measures 6 feet by 6 feet, or 36 square feet; the small square in the opposite corner measures 3 feet by 3 feet, or 9 square feet; and the two remaining parts each 6 feet by 3 feet, or 18 square feet each; altogether 81 square feet.

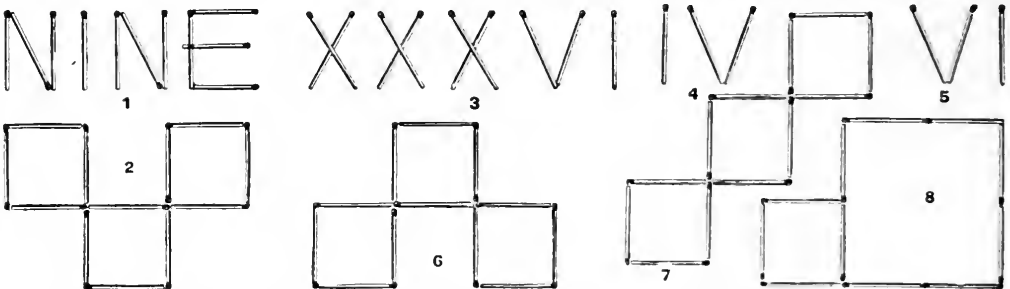
A boy or girl who understands Euclid, Book I, Theorem 43, and Book II, Theorem 4, will readily see how these two odd pieces of carpet together make a square, and how, in the other two ways of cutting the carpet, the whole squares can be made.

But if the carpet is to be divided up into three squares of equal size, it is necessary to cut it in the way shown in the fourth drawing, so that the first sister gets a square like the one numbered 1; the second sister a square made of pieces shaped like 4 and 5; the third sister

a square made of pieces shaped like 2, 3 and 6. Clever boys and girls may work out other solutions that are as correct as the one given here.



ANSWERS TO THE MATCH PROBLEMS ON PAGE 624



On page 624 appeared some problems to be attempted with matches or pins. The pictures above show how these problems are solved. It will be seen that a few of them are just "catches."

HOW TO MAKE BUTTER AND COTTAGE CHEESE

DO you know that you can make butter or cottage cheese, or both? If you wish to make butter, put some *sour* cream in a glass fruit jar and screw the lid down tight. Then shake the jar until you see small pieces of butter form inside. These should be carefully strained from the buttermilk and then washed in cold water. The water in the butter may be removed by pressing or "working" with spoons. (Wooden spoons or paddles are best suited for this.) Now add salt to taste, and

dip spoons in hot water, then into cold, and with them roll the butter into a ball. It should then be placed in a cool place to harden until used.

If you want to make cottage cheese, first heat some milk in a kettle or a double-boiler until the curd separates from the whey. Then strain through a cloth (cheesecloth is best) and squeeze the curd until it is rather dry. Next put in a bowl, and with a spoon mix with salt and sweet cream to taste.

A SMALL REED BASKET OR HAMPER

HERE we are going to learn how to make a little basket which may be used as a doll's hamper.

First, we will make the basket or hamper, for which we must carefully measure off seven pieces of "No. 4" (or fairly thick) reed or cane. Most of the big toy-shops sell this material for weaving, or, of course, it can be bought from any basket factory.

If we make the hamper 3 inches high, each piece of cane must be 16 inches long. These 7 lengths of cane are for the foundation of our hamper, and we will call them the "spokes" whenever we refer to them, as they remind us of the spokes of a wheel. These spokes are very important.

Form a cross with 4 spokes across and 3 spokes upright, the 3 upright spokes being in front as in picture 1.

Hold these between the thumb and first finger of the left hand.

Our next step is to select a long piece of "No. 1" (or fine) cane, which we shall call the "weaving-cane," as it weaves in and out the spokes, just as the threads of any woven material pass over and under each other.

We must hold the weaving-cane in our right hand, a few inches from one end. Place this end of the weaving-cane at the dot in picture 1, and pass it under the 4 spokes at A, over the 3 spokes at B, under at C, and again over at D. We draw this as tightly as possible and pass the cane under the tiny end to form a tie.

In picture 2 we are able to see just how the weaving-cane travels, if we follow it up from the letter L.

From this point we weave over one spoke and under the next, until we have passed 8 spokes,

At the place marked X in picture 2, we take two spokes together and treat them just as one spoke.

By taking the two together it fastens the odd number in quite securely. Continue the weaving over and under, taking care, when you come to the spoke with the little bit beside it, that you treat that spoke and the little bit as one. We must remember always to weave in the direction in which we began.

If we have done our weaving correctly, the weaving-cane will now pass under the spoke over which it went the last time round.

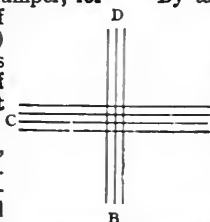
We must continue our weaving until we have covered about 1 inch from the centre of the basket. Then cut off one of the two spokes taken together and what is left of the tiny bit of weaving-cane where we started.

One very important thing which it will be well for us to make a note of just here is the right way to hold our work. Hold the work in the left hand perpendicularly, the weaving-cane being held in the right hand just like a skipping-rope about 2 inches away from the basket. We now slip the first finger out and hold the cane between the thumb and the second finger.

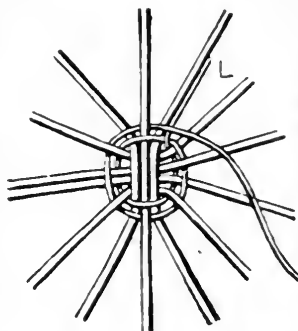
Don't think Mr. First Finger has nothing to do. He is a very important person, and acts as a guide to Mr. Weaving-cane, guiding and pressing him always into his proper place. We must also be very careful never to pull the weaving-cane, but to bend it round

the spokes, moving the basket up and down at the same time.

Every touch of our fingers has a permanent effect on the ultimate shape of our basket, and no subsequent pressure will alter it. We shall be able



1. Position of the spokes.



2. Beginning to make the basket.



3. The basket without the lid.



4. The lid of the basket.



5. The basket complete.

which brings us to the left side of the picture where we see two spokes taken together. Some of us may think this a mistake, but in weaving we must have an odd number of spokes, because where the weaving-cane passes over one time, the next time it must go under.

to begin a second basket much better after we have thus learned to weave properly.

Basket-weaving is most fascinating work when once we have acquired the art of weaving easily. From this small beginning it is possible to make any number of very pretty and useful articles.

How are we to turn up the cane for the sides? We notice the alternate spokes are on the top of the weaving-cane. These spokes we bend away from us. Weave round once again, when, of course, the other spokes are on the top. These also must be bent away from us. We must continue weaving as before, taking care to keep the spokes nearly at right angles to the bottom of the basket.

We must remember, as we weave the side, when the weaving-cane is going behind a spoke, to draw that spoke back with the guiding finger and slip the whole hand behind it to put the weaving-cane in place. The more we press on the spokes when drawing them back, the more the sides of our basket will slant outward.

By this time the side of our basket measures $2\frac{1}{2}$ inches from where we turned it up. Here we take a length of No. 4, or rather thick, cane to weave the other $\frac{1}{2}$ inch. An important point to learn just now is how to join a new piece of cane.

We must always finish off the end of the old weaving-cane, when we have come under a spoke,

by pushing the loose end of the weaving-cane down the side nearest to us of the same spoke. Take a new piece of weaving-cane and pass the end down the far side of this spoke. Both the old and the new weaving-cane pass behind the same spoke, but the join does not show at all on the right side of the basket.

To finish our basket we cut an inch off each spoke with the exception of two, which we leave to form the handle, as seen in picture 3. Each spoke must be turned back the opposite way from which we have been weaving, and pressed down the far side of the next spoke until it lies level with the last line of weaving. To form the little handle, we cross the two spokes and push the ends down so that one end goes in where the other starts from.

Having made our basket, we may now start the lid for it, which is made exactly as the bottom of the hamper, using 7 spokes about 6 inches long.

When the weaving exactly fits the top of our basket, we finish by pushing the spoke-ends down the sides of their left-door neighbors.

THE FIGHTING CLOTHESPINS

FEW toys afford more genuine amusement than this one, and few can be so easily and cheaply made. The material consists only of two round clothespins, such as can be bought at any grocer's or hardware store, a few pieces of thin wire, which can be purchased at any plumber's, a pin, and a piece of strong black thread. Coarse thread is best.

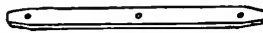
We first take two clothespins and pierce them with holes at the places marked in picture 1. That will give us in each pin four holes in all—one about $\frac{3}{4}$ inch from the top, one through the middle of the pin just above the legs, and one through each leg near the bottom. The holes should be made with a small bradawl which ought to be sharp so as to make the holes clean without splitting the wood. Having made the holes, we cut off the legs right at the top where they are joined to the body of the pin, leaving the top of the pin as seen in picture 2.



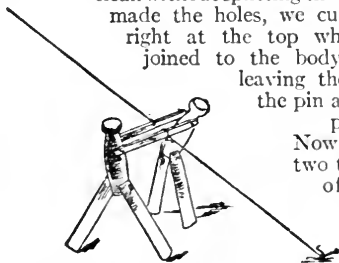
1. Clothespin, with holes.



2. Body of pin.



3. Slip for arm.



4. The wrestlers ready for work.

Now we take two thin slips of wood about three inches long, and make 3 holes in each—one in the centre and one near each end, as seen in picture 3. We take the pieces of thin wire and join the slips of wood we have just made to the body of the pins, one slip of wood to each side, as seen in picture 4. These slips do duty for arms, as can easily be seen from the picture. We bend over the wire at each end into the form of a loop, so that the arms will not slip off, but we must give room on the wire so that the arms can work round very easily indeed. Then the wire outside the loops can be cut off if it is too long.

Now the legs must be attached, wires being put right through the lower hole in the body, and the legs put on the wire by the holes which we have made. These also must work very easily; and the wire should be bent into loops at the ends and cut off just as when the arms were put on. We now take a strong piece of black thread 9 or 10 inches long, and tie one end of it through the hole in the middle of one of the arms, making a loop at the free end of the thread. A long piece of black thread, say, 2 or 3 yards long, should be tied to the other arm, using the hole in the middle of the arm. Our wrestlers

are now ready.

Through the loop at the end of the shorter thread we put a pin, and put it firmly into the carpet, as seen in picture 4. Then, if we take hold of the far end of the long thread, and hold it so that the wrestlers just touch the carpet with their feet, thereafter jerking the thread, the wrestlers will go through many amusing antics.

This toy looks very mysterious when the spectators do not see the thread. It is then difficult to understand what makes the wrestlers jump about so.

The best way to conceal the thread is to work the toy on the carpet when it is a little dark, and when the fire is the only light in the room. Then, if the performer has a long thread, which he holds behind his back, as in picture 5, the mystery will be complete.



5. The wrestlers performing.

If we dress the clothespins to represent savages we can have our warriors engage in struggles that look very real. Black wool makes splendid hair, while feathers will do for the tiny garments.

LITTLE PROBLEMS FOR CLEVER PEOPLE

THESE problems are continued from page 751.
The answers appear on page 1156.

WHAT WERE THE PRICES?

1. "You may give me three dozen pens and five dozen knives," said Uncle William when he was purchasing prizes for the boys at a Sunday-school picnic. Each knife cost twice as much as each pen. If he had bought three dozen knives and five dozen pens he would have saved \$2.88.

What were the prices of the pens and the knives?

WHAT IS THE WORTH OF TIME?

2. An express train travels from Manchester to London at 40 miles an hour, including stops. An excursion train runs from Manchester to London at 30 miles an hour, including stops. The fare by the express train is half a cent per mile higher than the fare by the excursion train. Reckoning the value of his time, a commercial traveler decides that it costs him as much to travel by the excursion train as it does to travel by the ordinary train.

What is his time worth?

HOW MANY MARBLES HAS FRED?

3. "How many marbles have you?" asked Fred's mother. "Well," said Fred, "if you add one-quarter to one-third of the number, you will have ten more than half of the number."

How many marbles had Fred?

WHAT WAS THE PROBLEM?

4. Harry's coat had rubbed against his slate as he returned from school, with the result that many of the figures in his long division problem had become rubbed out. Putting a x to represent a place where a figure had become rubbed out, the problem was like this:

$$\begin{array}{r} 215) \times 7 \times 9 \times (1 \times x \\ \times \times \times \\ \hline \times 5 \times 9 \\ \times 5 \times 5 \\ \hline \times 4 \times \\ \times \times \times \end{array}$$

He remembered that the result was without a remainder, and, being a clever boy, he filled in all the figures that had been rubbed out.

How did he do it?

HOW MANY MILES PER DAY?

5. Hicks walked 117 miles, beginning on Sunday morning and finishing on Monday evening of the following week. He walked each day one mile farther than the day before.

How many miles did he walk each day?

WHAT IS THE WORD?

6. There is a word of six letters, the meaning of which is made exactly opposite by changing the places of the two middle letters. What is the word?

TO MEASURE THE HEIGHT OF A TREE

THERE is a very easy way to measure the height of a wall, or a tree, or a church spire, that any boy or girl can use if he or she can do a problem in simple proportion. It is necessary that the sun should be shining at the time—that is all. Suppose that you have a tree and that the sun is shining; then the shadow of the tree is cast on the ground. You must measure the distance from the extreme point of the shadow to the place right under the top of the tree. If the top point of the tree is right above the middle of the trunk, then you must calculate half the diameter of the trunk in making your measurements. Suppose that the distance from the point of the shadow to the trunk of the tree is 40 feet, and that the tree is 2 feet thick. Then the total distance is 41 feet (40 feet + half the diameter of the tree). Now take a stick of which you know the exact length. Suppose that it is 3 feet long. Hold this upright with one end on the ground, and notice how far its shadow extends. You find, perhaps, that it is 6

feet long. Now multiply the length of the tree's shadow (41 feet) by the length of the stick (3 feet), and divide by the length of the stick's shadow (6 feet). The answer is $20\frac{1}{2}$, and you know that the tree is $20\frac{1}{2}$ feet high.

If you get odd inches in your measurements, work the problem out in inches instead of in feet.

You can also get the answer, though not quite so correctly, by seeing how many steps it takes to go from the edge of the shadow to the tree, being careful to make your steps as nearly uniform as possible. Then, by measuring the length of one step you can multiply its length by the number of steps, and find the distance. But in any measurement,

whether it be a tree, or a church, or a wall, make sure that you take the distance to a point immediately under the highest point, so that if it be a church spire, for instance, you must make allowance for the distance between the wall up to which you measure and the centre of the church tower. Otherwise your result will be wrong.



The height of a tree shown by its shadow.

SIMPLE KITES AND HOW TO MAKE THEM

THERE are many different kinds of kites. Some are quite simple and can be made as explained in this article. Others are made to resemble boxes, airships, and other things. They are used by scientists who study the atmosphere as well as by children in play.

The ordinary kite is made with very simple materials, and its manufacture costs very little indeed. First, we require the half of a hoop. The size of the hoop depends upon the size of kite you are going to make, or, rather, the size of kite that you will have will depend upon the size of hoop that you use. A hoop from a butter-keg will do very well for a small kite, and any grocer will be glad to give you one if you ask him, without expecting any payment for it. Do not use the whole hoop, but only a piece a little smaller than half of it. Choose the best part for this purpose, and cut away the remainder. Then you may thin the half-hoop with a pocket-knife, taking care not to take off enough to weaken it too much. You must thin it equally all round, and you should test it to see that you have not made it lighter at one side than at another. The way to test it is

simple. Take a piece of string and put it round the outside of the half-hoop; then cut it off to the exact length of the half-hoop. Double the string then, and again put it round the half-hoop as far as it will go from one end. Make a notch with the penknife where the end of the doubled string comes. Then balance the half-hoop on the edge of the knife-blade at this point, as seen in picture 1. If the half-hoop hangs evenly, and does not hang down at one end more than at the other, it is all right; but, if one end hangs down more than the other, you must shave a little more wood from the heavier end, so as to make it the same weight as the other end. When you have the half-hoop thinned properly and balanced, make a notch at each side of each end, close to the end, as seen in picture 2, and put it aside till the backbone of the kite is ready. It requires for the backbone a length of wood that will be strong and light. A piece of thin cane will do nicely if it is rather stiff.

But a long slip of wood—say, from 24 to 30

inches long—will do about as well. First thin and smooth this slip, and then tie it to the notch in the centre of the half-hoop, so as to leave 1 inch sticking up beyond the top of the half-hoop. Picture 3 shows the kite at a later stage, but shows also the position of the hoop and the backbone.

Now tie a thin, strong string to one end of the half-hoop, or top, as we shall now call it, at one of the end notches, pass the string once round the backbone, and the other end tie to the notch in the opposite end of the top. Balance the whole by placing one end of the backbone on one forefinger, and the other end of the backbone on the forefinger of the other hand. You can then see if the top swings heavier at one side than at the other. If one side is heavier, move the backbone along the string a little bit, until you find from the swing that it is right in the middle between the two ends of the top. Picture 6 shows how to test the balance.

Having done this, next join each end of the top with string to the bottom end of the backbone, where you put a notch or a hole to receive the string. The kite now looks like picture 3. All the strings should be

fairly tight.

You now need a large sheet of thin, strong paper. A sheet of a large newspaper would do, but imitation-parchment paper, if you can get it, is stronger and better. The

paper must be large enough to cover the entire kite from top to bottom and from side to side. If the only paper you can get is in too small sheets, you can make one sheet large enough by pasting two or more pieces together at their edges.

Next place the kite on the top of the paper, on a table or on the floor, and with a pencil draw a line round the kite, about 1 inch outside the hoop top, and $\frac{1}{2}$ inch outside the stringsides, as seen in picture 4. Paste or gum the edges of the paper, and fold it over, and stick it down. Turn it over carefully, and stick on two or three patches on the back, thereby sticking the backbone to the covering paper and strengthening it. The kite is made, and we may prepare to fly it.

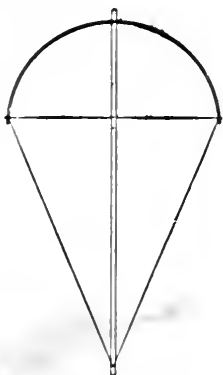
Tie a string at the back from side to side, from one end of the top to the other end of the top.



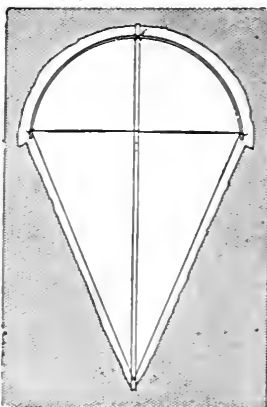
1. Testing the top.



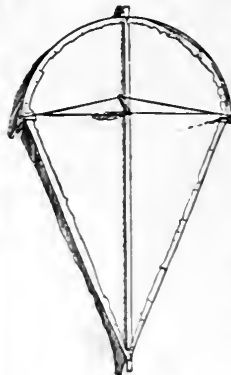
2. Top with notches.



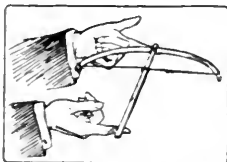
3. Frame of kite.



4. Cutting the paper.



5. Strut in position.



6. Testing the balance.

HOW THE CONJURER MAKES HIS MONEY

Take a piece of wood about 4 inches long, and having cut a notch in each end of it, fit it between this string and the backbone with one end on each. From the back the kite will now look like picture 5.

Tie a string from top to bottom of the backbone in front. This is the bridle. It must be slack, so that the kite will fly properly.

Tie another piece of string to the lower end of the backbone and let it hang loose—say, about 5 yards long. This is the tail. Make some loops in the tail right down, 2 feet apart, and put in tufts of paper, and then pull the loops tight. These tufts are streamers, and make the kite look well when we fly it.

The kite is now ready for the field. It is taken out when the wind is fairly strong. One should have a ball of string, or more than one ball, wound upon a stick. Tie the end of this string to the bridle so that the kite hangs horizontal when suspended, and tie a piece of turf to the end of the tail. One boy takes the kite by the bottom end, leaving the tail lying free. Another boy takes the ball of string to which the kite is tied, and goes away about 10 yards in the

direction from which the wind is blowing. Both stand and wait for a breeze. Then as the boy with the kite cries "Go!" he throws the kite violently forward into the air, and his friend runs his best. Then, if it has all been properly done, the kite

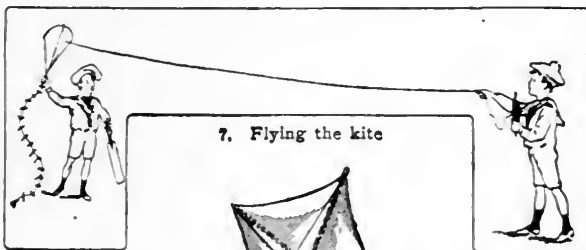
soars aloft steadily in the wind, and the string can be let out carefully and gradually. If the kite does not rise, the tail may be too heavy, and some of the turf must be taken off. If it wobbles, or rushes from side

to side, the tail may be too light, and a heavier piece of turf must be put on the tail.

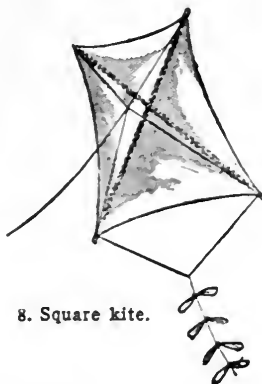
This is, perhaps, the simplest form of kite. A square kite is another very simple shape, and is shown in picture 8. From this picture, and from the description of how to make the other kite, you should be able to make a square kite without further instructions.

The kite-maker must remember that the more pains he takes with his work the better will the kite

fly. Where pasting has been done, the edges of the joined paper should be watched for any looseness. The sticks used should be as smooth and even as possible.



7. Flying the kite



8. Square kite.

HOW THE CONJURER MAKES HIS MONEY

EVERY boy has a liking for bright dimes, so I am going to tell you a way of making them for yourself, not imitation coins, but real good money. The only drawback about the process is that each dime you make costs the same amount to produce, but you need not tell your friends that.

To coin money, of course, you need a "die." The die, in this case, is in two parts, as illustrated in picture 1—a sort of little anvil (A) and a cover (B), the one fitting over the other. With this are used three "blanks" of bright metal, supposed to be silver, but in reality tin. To show the trick, you put one of these on A, which is just large enough to receive it, and cover it with B. You stamp it by bringing down one end of your magic wand smartly upon it. If you don't happen to have a magic wand, a ruler or even a lead pencil will do just as well. You now lift off the upper die, when the blank is found to be transformed into a bright dime. You take this off, put another blank on the little anvil, cover it, and stamp it as before. When the upper die is lifted, the second blank has been coined into a dime. Once more the process is repeated, and a third dime is the result. The secret lies in the construction of the little anvil (A). This looks like a solid bit of brass, but it isn't. Instead of being all in one piece,

as it appears to be, it consists of four distinct parts (A, C, D, E) as shown in picture 2. These are, in fact, mere shells, fitting one over the other in regular order. The cover (B) has no speciality.

To prepare for the trick you must, in the first place, provide yourself with three ten-cent pieces, the newer and the brighter the better.

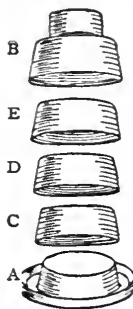
One of these you place on A, and cover it with C. You place another dime on C and cover it with D; and, lastly, place the third coin on D, and cover it with E. So arranged, the whole looks exactly as A does in our first picture.

To show the trick, you lay the first of your blanks on E, and cover it with B. After stamping it as already described, you lift off B, pressing its sides lightly. The effect of this is that E comes away inside B, carrying off the blank between them, and leaving the uppermost dime exposed. The process is repeated for each dime.

The little apparatus, which is known as the Magic Mint, is a recent invention. It is so neatly made that, when duly prepared with the needful dimes, you need have no fear, unless you are exceptionally clumsy, of lifting off more than the proper shell or shells. A hint may be given to the grown-up reader. Apart from its attraction for the juvenile performer, this will be found an admirable trick for exhibition by good-natured uncles or other relatives.



1. The conjurer's mint.



2. The anvil.

HOW TO MAKE A LEATHER SUCKER

MUCH amusement may be had with a sucker.

It is the simplest toy made, and also the least expensive, because if we have an old boot and a piece of stout string we have all the material necessary for making it. All we need then is a good sharp knife to cut the leather. The leather we require must be not less than 3

inches across each way; it may be fairly stout leather, but not too thick, and the first thing we do is to soak it well in water to make it soft. We may throw it into water

and let it lie there all night or longer. When it has been made nice and pliable, make a hole in the middle of it. We can use a thin round wire nail to make the hole, driving it through the leather with a hammer.

The next thing is to make the leather round. We can mark the circle by using compasses, with the hole that we have already made as the centre; but there is a simple way of marking the circle without using compasses. We take a short piece of string and make a loop at each end, like picture 1, so that the two loops are from $1\frac{1}{2}$ to 2 inches apart. Then we put a nail through one loop and the hole that we have already made, and put another nail through the other loop, pressing its point upon the leather. Keeping the string taut to full extent, we now move the second nail right round in a circle, pressing all the time, and it will make a circular line as shown in picture 2. Or by pressing the tin cover of a round can or bottle on the leather we can make a circle outline. By cutting the leather at this line we make a disk,

which is the sucker. We can improve it a little by trimming the edge on one side all round in the manner illustrated in picture 3. A good stout string, say about 3 feet long, can now be put through the hole, and a knot made on its lower end to prevent it from slipping out again.

The sucker is now ready for use. Soak it in water well, then place it on a large smooth stone and press it down with the foot. The stone can now be lifted by pulling the string, the

power of the sucker being great enough to resist the weight of the stone.

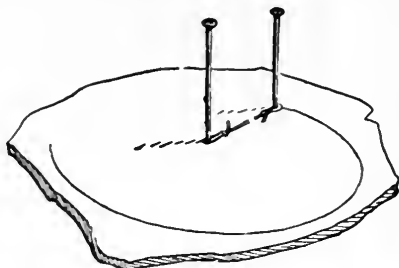
Why does the sucker act in the way that it does? Its behavior is explained by what we know of the weight, or pressure, of the atmosphere. The force with which we pull the string tries to draw the leather away from the stone, but instead of doing so it creates what we call a vacuum, or a space without air, under the leather, and the pressure of the outside air on the stone makes the stone stick to the leather.

Many games can be played with leather suckers. For instance, there is "Wishing." Two players take part. A large smooth stone is chosen as the Wishing Stone. One player fastens his leather sucker on one side of this stone. His opponent sticks his sucker on the other side. Then begins a kind of tug-of-war. Both players

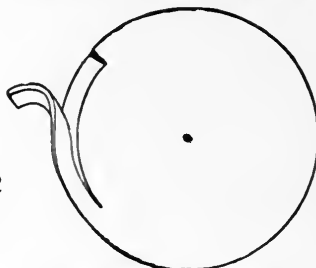
try to pull the stone away from each other. Hands or feet must not touch the stone. The player whose sucker remains on the stone is supposed to get his wish.



1. Loop of string.



2. Cutting the circle of leather.



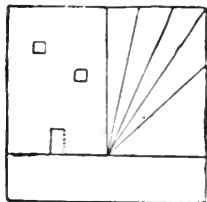
3. Trimming the edge of the sucker.



4. Using the sucker.

A WINDMILL FROM A SQUARE OF PAPER

WE can make an excellent picture of a windmill, with its sails all set, like the one shown here, by simply cutting up a square of black paper into ten pieces and pasting them down upon a sheet of cardboard.



1. The paper marked ready for cutting.

with a sharp penknife, cut the paper up into ten pieces as marked, and paste these down upon the cardboard in the positions shown. The

windows and door are made by pasting the little pieces of paper of which they are formed upon the cardboard, putting the white surface uppermost, and the bars of the window and the panels of the door may be drawn in with pencil. In this way every piece of paper is used up, and we have quite a good picture of a windmill. To have a neat picture we must be careful in pasting.



2. The windmill completed.

GAMES TO PLAY AT A PARTY

THE MAN IN THE MOON

THIS game is a version of the popular Donkey Contest. Instead of pinning the tail on the Donkey, we go blindfolded to a white disk, and draw the Man in the Moon. Any number of players may join in this game. Pin as many 12-inch disks of white paper as there are players to a large piece of dark paper hung on the wall. Blindfold each one in turn and lead him to a disk, instructing him to draw with a piece of soft black crayon, the features of the "Old Man in the Moon." A prize may be given for the best drawing.

HORSE-RACING

TAKE five pieces of narrow tape about $\frac{3}{4}$ inch wide, and tie to a stationary object. Select five players to stand at the end of the tape, each with a pair of sharp scissors. At the signal each "horse" starts to cut through the centre of the tape, taking care not to cut horizontally across, the one finishing first being the winner. If he cuts the tape off, he is counted out. Knots may be tied in the tape to increase the fun and the difficulty.

A POTATO ANIMAL CONTEST

TWO materials we need to have on hand for the party are: a large number of potatoes of various sizes and shapes, some wooden skewers, toothpicks, shoe buttons for eyes, and some yarn for the manes and tails. Allow a certain amount of time for the players to make the animals (horses, elephants, cats, monkeys, etc.), and award a prize for the most realistic animal.

THE THREE-LEGGED RACE

THE boys stand together with the inside legs tied together firmly at the knee and the ankle. Another couple tied in the same manner also stand in line. At the signal "Go" they start to race to a given mark across the room, and the couple who reach there first is the winner. This game causes much merriment among the spectators, and the boys have much fun in spite of tumbles. Often the speediest couple will have a fall while the slower pair will succeed in winning the race.

CLOTHESPIN RACE

THE players under two leaders are divided equally into two rows facing each other. Each leader holds a handful of clothespins, and at the signal passes them to his neighbor, one at a time, the object being to pass all the pins down and back again. If a pin is dropped it must be picked up by the one who let it fall, and then passed along. The side which gets all the pins back first wins.

ADVERTISEMENT CONTEST

CUT from magazines or papers the pictures from a number of advertisements that are fairly well known, and mount each separately on a numbered card. Hang these around the walls of the room on the "eye line," and give each guest a piece of paper and a pencil. The person wins who guesses the largest number of advertisements. It is surprising how difficult this game really is, for we may be familiar with the pictures but forget

the names of the advertisers. This game may be varied by using pictures of famous persons, authors, actors and artists, each mounted on a numbered card.

JACOB AND RACHEL

THERE are games and games, of course, but there is no game that causes more laughter and fun than Jacob and Rachel. It can be played in the gymnasium, in the playground or outdoors, and from eight to thirty players may join in the merriment.

One player, a boy, "Jacob," who is blindfolded, and another, a girl, "Rachel," stand in the centre of a circle of players. The object of the game is for Jacob to catch the other player, "Rachel," by the sound of her voice, while "Rachel" must try to avoid being caught even though she answers his questions.

"Jacob" starts the game by asking, "Rachel, where art thou?" Rachel replies, "Here am I, Jacob," and quickly runs to another point within the ring, to avoid his outstretched arms as he gropes blindly about for her. Rachel may stoop to evade him, or may dash from one end of the ring to the other, but may not leave the circle. Jacob may repeat his question any number of times, and Rachel must reply each time.

When Rachel is caught, Jacob must guess her name. If he guesses correctly, he may return to the ring and Rachel is blindfolded. The players in the circle select a new Jacob, and Rachel now starts the game by calling out, "Jacob, where art thou?" to which he must reply, and Rachel then tries to catch him and guess his real name.

The game is made more amusing when a large number of children are playing, for then two Rachels and two Jacobs may be playing in the ring. The two Jacobs are first blindfolded and two girls may be chosen, one assigned to each boy. Jacob must catch the girl chosen as his Rachel and guess her name, and if he makes a mistake by catching the wrong Rachel he must let her go and hunt for his own Rachel.

This game is usually played by both boys and girls, but where all boys or all girls are playing, the same names are still used, but one of the party is personated by a player of the opposite sex.

HEARTHUG HIDE AND SEEK

ONE of the players is counted out to go and hide, but, without leaving the circle, thinks of some good place in which it may be supposed he or she is hiding. Having called Cuckoo! the others begin guessing one spot after another until the right one is hit upon, when the guesser hides in turn. In such a game the hiding-ground may be anywhere in the world, A street in Paris, or the top of Mont Blanc.

Each player takes it in turn to ask questions as to the whereabouts and nature of the hiding-place; but as the one who is answering may only say Yes or No, the seekers may have a long search. It is their business to question the hidden one so that his answers, Yes or No, give some idea of the place. For example, they will naturally ask whether it is far or near, high or low, and so on.

SUGGESTIVE RECIPES—POTATOES

MANY girls like to help with the preparation of meals. Some girls cook a great deal, while others do just a little. Wouldn't you like to prepare potatoes which will delight the family at luncheon some day? Here are two suggestive recipes.

BAKED POTATOES WITH CHEESE

First, select medium-sized potatoes, scrub them well, and dry them. Place them in a moderately hot oven and bake until soft (usually requires about 45 minutes). Turn them occasionally so that they may be baked evenly. When soft, press them between the fingers, and break the skin a very little to let steam escape. Then cut the potato in half lengthwise; scoop out the potato inside and mash it. Next add some hot milk, butter, salt and pepper, and beat all thoroughly. Now return this to the potato shells. Then sprinkle grated cheese over the top and return to the oven just long enough to melt the cheese and brown the potato. If desired, a little paprika may be added just before serving.

CREAMED POTATOES

First, cut cold boiled potatoes into about one-half inch cubes. Next add white sauce and stir until the potatoes are thoroughly heated. Then sprinkle with finely cut parsley and serve. The white sauce is made as follows:

WHITE SAUCE RECIPE

2 tablespoons butter	1 cup scalded milk
2 tablespoons flour	$\frac{1}{4}$ teaspoon salt
few grains pepper	

The butter is placed in the saucepan and stirred until it is melted. Then add the flour, which is mixed with the seasonings, and stir until it is thoroughly blended. Now gradually pour on the milk by adding about one-third of it at a time and by stirring until well mixed. This should be cooked until the sauce boils, when it may be used as already explained.

HOW TO MAKE PERFUME FROM FLOWERS

WE all know that scent is made from flowers, and we have often wanted to try to produce some for ourselves. Perhaps we have shaken a few petals up in a bottle with some water, and then have been disappointed that the liquid did not possess the same fragrance as the perfume which we put on our handkerchiefs. Our failure was simply due to the fact that we did not set about the matter in the right way, and if we follow a process which is much after the lines on which the real scent-producers work, we shall meet with more success.

In the first place, it is necessary that we should gather the petals of roses, violets or other blooms soon after they are open, and when they are quite dry. In order to make certain that there is no moisture on the blooms, it is a good plan to spread them out on a tray for a few minutes. While they are drying we may start the next stage in the process of the perfume-making. We shall need some of the best Lucca oil for this purpose, and it is well to use that which is sold for table purposes, as the commoner sorts are not so pure.

Now get a sheet of wadding, and out of this cut some pieces of the material which shall be of a size to slip into a three-pound glass jam-jar. It is easy to round them off with a pair of scissors so that they fit into the jar quite easily.

The next step is to get a good-sized pie-dish, and into the bottom of this put some of the pieces of wadding, and then pour on a quantity of the oil. See that the bits of cotton-wool become thoroughly soaked with the oil, and when you have got ready about eight or a dozen pieces in this way, it is time to fetch the petals which we left on the tray. Now get your jam-jar and be sure that this is quite clean, and at the same time ask cook to let you have a small handful of salt. When you have all the things around you, you may start the next stage in the making of the scent. First of all sprinkle a thin layer of salt on the bottom of the jar, then cover this over with petals, and on the top of the petals place one of your pieces of wadding which has been soaked in oil. Then put some

more salt, another layer of petals, and one more piece of wadding, and so on until the jar is quite full. It is now necessary to make sure that the jar is perfectly airtight, and the best way to bring this about is to tie a cover of grease-proof paper very tightly round the opening. Perhaps it will be as well to put the paper in two thicknesses, so as to be quite certain that no air can come in.

At this point the jar should be removed to a warm place, if possible, where it will get plenty of sunshine. Remember that the more the sun shines on the petals the more likely will you be to get the best of the fragrance from the flowers.

The jar of petals must now be left as it is for at least a fortnight. At the end of fourteen days the cover may be taken off the jar containing the flowers. The thing to do next is to press the oil from the layers of wadding, and this will be found to smell like the best scent, according to the kind of flowers which have been treated. If roses have been used, the perfume will smell of these flowers, and so on. It is rather difficult to get all the oil out of the contents of the jar, and the easiest way is to use a big spoon, putting this inside and then pressing the layers as hard as we can. If, after doing this, we tip the jar up, the oil will trickle down into a bottle or anything we may have underneath. It will be found that this scent will last almost for any time if kept in a well-stoppered bottle. A few drops placed on a handkerchief will give a splendid fragrance that will last a good deal longer than many of the cheap scents which are purchased.

After we have learned how to make the simple scents by the use of one kind of flower, it is interesting to try to prepare some combination perfume. As a matter of fact, nearly all the shop scents are produced by blending several scents together. A very pleasant perfume may be obtained, if when treating the rose leaves we scatter a few lavender blossoms on each layer; while in the same way rosemary leaves and violets will give us quite a fresh scent.

THE NEXT THINGS TO MAKE AND TO DO ARE ON PAGE 1023.



The peak of a Cambrian rock in Wales.

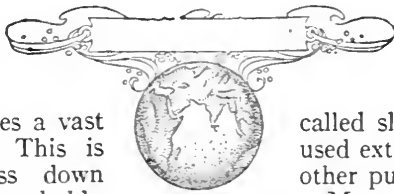
THE WORLD OF THE CAMBRIAN PERIOD

FAR down under most of the surface of England and a large part of Wales and Scotland lies a vast sheet of slaty rock. This is only a mile or less down in some places, but probably more than five miles down in others.

This great bed of rock is nearly three and a half miles thick. It is known as the Cambrian formation, after the ancient name for Wales, because these wonderful rocks were first found in that country.

In Canada is found the greatest known thickness of Cambrian rocks. This occurs in British Columbia, where the layer is 40,000 feet thick. In the United States the corresponding rocks are not so thick, perhaps 12,000 feet, and there are no broad expanses of these rocks. They are found in long narrow strips from the Adirondacks to Newfoundland, and also southward along the eastern skirts of the Appalachians into Alabama. Large areas are also found in Wisconsin and Missouri fringing much older rocks. At the bottom of the Grand Canyon of the Colorado in Arizona these rocks are also exposed. In fact, most of North America to-day is probably underlain by these rocks.

In southeastern Pennsylvania and elsewhere geologists discovered the Cambrian rocks to have the wonder-



ful and curious property of splitting into the very hard, smooth thin sheets called slates. These slates are used extensively for roofing and other purposes.

Most of the best slates in England come from Welsh quarries in Cambrian rocks.

Not all of this Cambrian layer is composed of smooth and fine-grained sheets of slate. It contains strange things and records, remains of great masses of rock that existed before it was formed. We find ripple-marks of the waves that beat on those shores many millions of years ago, and pebbles worn smooth and round by long years of tossing about by the breakers of those far-off days. Even marks of raindrops that fell on the soft, sandy mud, and sun-cracks which formed when it had partly dried, are found in this wonderful rock that now lies so far down beneath our country.

But this is not all. Forms of curious creatures, utterly unlike the life of our day, are found preserved in the earth. Many of these are shown in the pictures. The upper picture on page 907 shows them as they are believed to have existed. The lower picture shows them as they are found at the present day, imbedded in the slaty Cambrian rock.

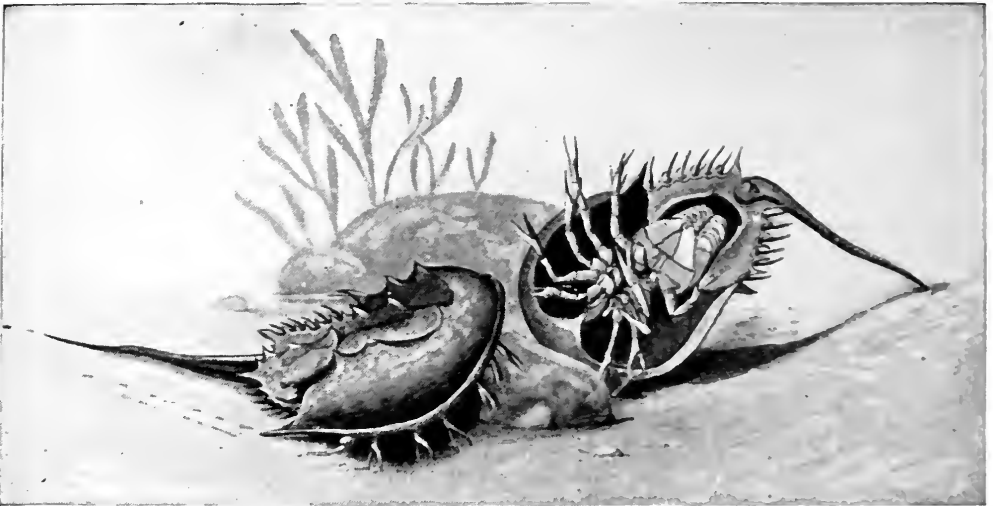
It is thus easy to see that this colos-

sal bed of rock, deeper than the loftiest mountain in eastern North America, and now many thousands of feet below most of our country, was once at, or near, the surface. But it was worn down or sunk below sea-level. Thousands and thousands of feet, even miles, of other strata were piled on it in places. The terrific weight pressing on it from above and the expansive forces due to the great internal heat of the earth pressing on it from below, bent and twisted the great bed of rock in various ways. Finally it was transformed into the hard slates that resist fire and water, and are so valuable to man.

Careful study by geologists has revealed the amazing fact that this hard,

everlasting beat of the waves on the shore, or the sound of the rushing rain and roaring wind that wore or tore away those earlier rocks out of which the Cambrian rocks were made, were the only sounds.

The sea, on the other hand, was teeming with life even at this early period of the earth's existence. It is believed that it was in the sea that the first forms of life—probably with neither shell nor backbone—came into existence. During the long Cambrian Period life made enormous strides. Creatures wonderfully made—such as the curious little phyllo-pods, ancestors of our shrimps, prawns and lobsters—flitted about, and jellyfish pulsed their way through those ancient seas. But the most remarkable of all



The king crab of China, the nearest living relative of the trilobite of the Cambrian Period.

smooth slate was once mud, and that it was deposited on the shores and bottom of a large shallow sea. We see, therefore, that nearly one-half of what is now the United States and British Columbia was in those days the bed of a vast sea.

This was many years before most of the kinds of life we are familiar with had come into existence. There were then no creatures with backbones. There were no fishes in the sea, no birds in the air, no mammals and no reptiles on land. There were not even insects. There were no trees, nor palms, nor flowers, nor ferns. No flora at all adorned the land, except possibly mosses and lichens, the lowliest forms of vegetation. There was neither the song of bird, nor the hum of insect, nor the rustling of leaves, to break the stillness of those far-off days. The

were the trilobites. These strange crustaceans, for they were not fishes, were in those times the lords of creation—great things as much as two feet long, and swarming everywhere.

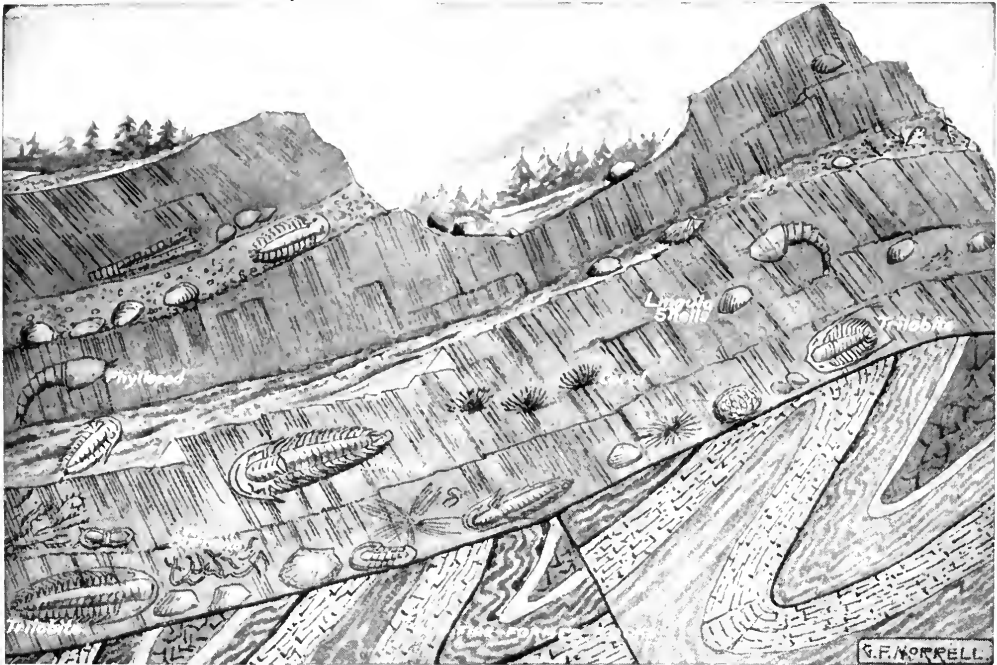
The trilobite was a soft-bodied creature inclosed in a shell showing plainly a head part, a body part and a tail part. This three-part, or three-lobed, body gave the creature its name. It had a great shovel-like head, enabling it to penetrate the mud in search of food and shelter. The eyes of the trilobites were most wonderful, some having as many as fifteen thousand facets. The presence of creatures with so many elaborately developed characters at such a remote period is evidence that life must have existed long ages before.

THE NEXT STORY OF THE EARTH IS ON PAGE 1031.

IMAGINARY VIEW OF THE CAMBRIAN



A view of the world in the Cambrian, with a section through the sea showing some of the creatures of the period—ancestors of shrimps, prawns and lobsters.



A section through the rocks of the Cambrian, showing their slaty character, with fossils (greatly enlarged) imprisoned in the crumpled-up strata.

FOUR COUNTRIES OF THE NEAR EAST



This map gives a bird's-eye view of Syria, Mesopotamia, Arabia and Persia. It shows also the north-eastern coast of Africa and the new little Soviet republics of Georgia, Azerbaijan and Armenia. The loveliest part of Persia is the district around the Caspian Sea. The country has valuable oil wells, and in the Persian Gulf rich pearl fisheries.



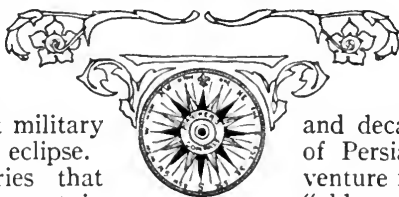
The Shah-Chiragh Mosque at Shiraz in Persia.

PERSIA AND ITS STORY

PERSIA is one of the countries that has lingered on into modern life, after a period of great military glory followed by long eclipse.

Among the countries that have been ranked as great in the past it is the one that has fewest of the conveniences that invention and manufactures have brought to the civilized world. Travel in Persia is unaltered almost everywhere from the most primitive and roadless times. To the stranger the interest in the country is chiefly its old-fashioned methods of travel, by horse, or camel, or donkey, across regions that are checkered with every danger, pathless mountains, dreary deserts (often salt), and a frequent liability to be robbed. It is a land where the nearness of disagreeableness and danger drives away dull monotony.

The relief comes in the form of beautiful fertile vales wherever there is running water. It is this valley scenery set in the midst of dreary scenery that has given Persia the reputation of a paradise, scented by the rose, made melodious by the nightingale, and offering luscious fruits and nectar to the taste. Such places may be found, but the way to them is long, monotonous and rough. The cities, too, that are supposed to be the country's glory, Isfahan and Teheran, are rather



sad instances of grandeur that has seen better days and become tawdry

and decayed. The two claims of Persia to attention are adventure for the active man, and "old, unhappy, far-off things and battles long ago" for the lover of romance.

Persia, or Iran, as its people call it, is a lofty plateau seamed by valleys and ridged here and there by mountains. Almost wholly mountainous in the west and northwest, it sinks into plains in the north and east which are mostly deserts and scarcely habitable even for nomadic people. Yet in its towns Persia has some ancient manufactures—silk, carpets, shawls, wool and felt; and in the country produces wheat, rice and cotton, fruits, gums and drugs. It also has considerable supplies of the world's most urgent need for transport purposes in civilized lands—that is, oil.

The area of the country is about 628,000 square miles, or, say, twelve times the size of Alabama. The population is estimated at ten millions. The people, once sun-worshippers according to the creed of Zoroaster, are now almost all Mohammedans of the Shiite sect, whose sacred place is Kerbela in Mesopotamia. The most sacred town within the country is Meshed, in the northeast. The largest

cities are Teheran, the present capital, with about 220,000 people; Isfahan, the old capital, with 90,000; Tabriz, the chief inland trading place on the railway from the Black Sea, with 180,000; Meshed, 60,000; Shiraz, 50,000.

A traveler has given us a description of a journey by automobile through Persia which pictures the country in detail. Round the south of the Caspian, the Garden of Persia, we pass through a paradise of green vegetation of every kind, from rice-fields shimmering in water to stretches of daisies, lilies, irises so high that one can easily be lost in them; everywhere are lovely lilacs and other flowering trees in which the nightingales sing. But this is only one aspect of Persia, as we soon discover when we push on through the mountain barrier that guards the great plateau of Iran; and we shall be lucky indeed if the car does not break down with bounding from rock to rock or sinking into the stiff mud of the almost neglected roads.

THE LONG AND TIRING JOURNEY ACROSS THE STONY DESERT

If the car does break down, the alternative is to hire a native carriage, without springs, and change horses at the post-houses; and a long and wearisome journey it is, for hotels and inns, as we understand them, are unknown. Day after day we plod along over the stony desert, occasionally relieved by dark forests and spots of cultivation. In the distance we see dry and grim-looking mountains. And the sun pours down in intense heat, so that the caravans with the heavily loaded camels travel only by night.

It is a relief to see the white-pointed peak of Demavend, and at last to enter Teheran. Under its sky of fixed blue the roses flower for which Persia is so famous. Hedges and gardens display great masses of them, and the fresh, dry air makes us ready to enjoy everything. The palaces and gardens are very fine, also the beautiful lustre pots, and glorious old materials, brocades and carpets that we are invited to buy. And the crowds that pass! These are so different from any we have seen before. Besides the interesting camels and gray donkeys there are women with long, thick white veils and full black cloaks covering them up completely, and men of different nationalities—Hindus, Turks, Mongols—besides the Persians in their high black hats

and brown flowing robes. The followers of the Prophet are everywhere, in their turbans, sashes and robes of green; and the mullahs, or priests, are conspicuous in their white headgear among the crowd.

A GARDEN CITY IN THE MIDST OF A DREARY DESERT

But our object is to push on to Isfahan, over many more miles of burning desert, with the sand too hot to touch, though at night the air is crisp and dry and the deep sky is simply blazing with stars. Every now and then there is the joy of an oasis, with its limpid streams and little village surrounded by fields of corn and rye and blooming wild flowers. When these are passed, there is again the smarting heat, the burnt-out-looking mountains, with their sheer wall of every shade of dull red and dark purple, and not a tree or blade of grass to lighten the desolation.

At last we see the domes of the mosques of Isfahan between the trees, and turning from the bare mountains in the distance, which now look as if bathed in gold, we do not know what to enjoy most. The avenues of trees, the fields of roses and white poppies, the gardens, the pale green streams and canals, the buildings of the great Shah Abbas, which date from the end of the sixteenth century—everything is wonderful and interesting. The enameled tiles and plaques, the blue cupolas and minarets of the mosque, the fine square, all fill us with admiration; and there are also the immense bazaars where we can buy everything under the sun, and where potters, and weavers of cashmeres and carpets, and leather-workers are all following their interesting and useful trades.

HOW THE CHILDREN LEARN IN THE SCHOOLS OF PERSIA

Unbelievers are not allowed inside the mosques; but we must not miss the infant school, where the children sit with their Korans on their laps, chanting their lesson, following the lines with little pointing fingers, and swaying themselves backward and forward to imitate the Prophet fleeing on his camel.

That is Persia as it is seen to-day on its one main road past its two capitals. Now we must look at its more romantic past.

The Persians belong to the Aryan-speaking family of nations, from which we ourselves and the people in Europe are

IN THE INTERIOR OF AN ANCIENT COUNTRY



A view of the old town of Sultanabad in the Province of Khorassan.



The town of Dizful in Arabistan.



A splendid bridge at Isfahan.



Donkeys are much used in Persia in agriculture.

descended. Trained in poverty, strong in body, simple in their lives, they swept down toward the old nations of western Asia, who were weakened by wealth and long prosperity. Some settled between Assyria and the Caspian Sea, and are known to us as the Medes. The first of their kings about whom we can be certain became the ally of Nabopolassar, who led the Babylonians in their final struggle against Assyria. It was this king, Cyaxares, who took Nineveh, and gave the death-blow to the empire of the King of Multitudes, as Ashur-bani-pal and the rest loved to call themselves. Nabopolassar, who became the founder of the new Babylonian monarchy, had the southern part of the great Assyrian empire for his share, while Cyaxares stretched the boundary of his country of Media away westward till it touched Asia Minor. The successor to this enlarged Median kingdom was Astyages, who was dethroned by one of the great generals that stand out in the world's history. This was Cyrus, who led the Persians from their mountainous home to a series of brilliant victories.

The Persians were of kindred stock with the Medes. Cyrus was a vassal of Astyages, and after the revolution which made him king of both the Persians and the Medes, the two nations settled down to an equality, and became, to all intents and purposes, one people.

THE WEALTHY CRÆSUS AND THE ALL-CONQUERING CYRUS

The ambition of Cyrus soon led him to extend his empire over the western part of Asia Minor. There was in Lydia at that time a king so rich that the expression "as rich as Cræsus" has passed into a proverbial way of describing a man of great wealth. He did his best to arm his country against the invaders, but his allies failed him, and Cyrus became master of all the part of Asia that is washed by the Black Sea and the Mediterranean.

Then, about 539 years before Christ, came the turn of Babylon! Some of the barrel-shaped cylinders on which Babylonian history is written, and which are now to be seen in the British Museum, tell of the prayers King Nabonidus offered up for himself and his son Belshazzar.

How strange it seems to us! The father honoring the gods, the son carelessly feasting, while the renowned Cyrus, with his army, was actually outside the

huge walls. The tawny waters of the Euphrates, which flowed through the city, were changed from their course, the army poured in by the river-gates, and the conquerors entered without battle, so that the city was spared. Mention is also made of the homage and tribute paid by the inhabitants and peoples round, and how Cyrus pleased the people by restoring the images of the gods to the shrines to which they belonged in other parts of the country. The tablets of this reign and the succeeding ones show that life went on in the city and country much as it had done before the Persian conquest.

THE RELIGION THAT ZOROASTER TAUGHT THE PERSIAN PEOPLE

The religion of the new-comers differed at first very much from that of the Babylonians and Assyrians. It was much simpler and purer, though later it was influenced by idolatries of the older people.

The famous old faith from the Far East, which held the sun and fire in adoring reverence as the expression of the All Ruler of the world, was taught to the Medes and Persians by the great Zoroaster.

Cyrus showed much sympathy with the Jews, who also were worshipers of one God, and had been long held captive in the country he had conquered. It was in his day that the joyful processions of the great return began to set out across the desert from Babylonia toward the home which they so ardently longed for. As they went they sang the songs that were impossible for them in the "strange land" of their exile.

After the great Cyrus came his son Cambyses, who wrought much misery and havoc in his own family and in Egypt, where he went as conqueror. Darius the Great, who followed Cambyses, though not of the family of Cyrus, was a vigorous and strong ruler, crushing rebellions as they arose in the various parts of his immense empire, and arranging for its government and good order with ability.

THE STORIES OF OTHER DAYS THAT ARE READ ON THE ROCKS

Much about this king has been learned from tablets and inscriptions found on rocks—chiefly that of the rock of Behistun, which proved such a valuable key to reading the cuneiform writing. The account of the wars and conquests of the great king had to be cut in the Babylonian and Scythic languages as well as in Per-

ALEXANDER AT THE PERSIAN CAPITAL



After repeatedly defeating the Persians, Alexander reached Persepolis, their magnificent capital, where were gathered hoards of wealth, and it is said that the treasury alone contained a sum equal to \$138,000,000, which fell to the Macedonian conquerors. But although "Master of the World," Alexander was not master of himself. He lacked self-control, and he stained his character by his excessive love of wine. For many days he remained at Persepolis, spending his time in reveling, then burned the city.



At the battle of Arbela, which was really fought at Gaugamala, about twenty miles from Arbela, Alexander finally overthrew the Persian power, totally defeating the huge army of the third Darius, which some have estimated at over a million men. In this picture Alexander is seen, on the eve of the battle, gazing into an altar-fire while a priest is invoking the gods. In the distance is the Persian camp.

sian, so that the chief nations under his rule might read and understand. We have, too, a fine portrait of the king, cut in the rock, receiving the submission of the chiefs of revolted nations, all roped together.

A cylinder seal of the king, giving his name in the three languages and showing him hunting a lion from his chariot, reminds us of the particulars that we have of this king in the Bible story of Daniel.

**THE WORD OF THE KING WHICH
COULD NEVER BE BROKEN**

On the slabs of the Assyrian kings we can see the cages in which the lions were brought to the hunting-field from dens such as the one into which the aged Daniel was thrown, and a seal—the kind that is rolled over moist clay—is shown, that might well be the one which Darius used to prevent any tampering with the order he had so reluctantly given. The word of the king, once passed, by the laws of the Medes and Persians, could never be broken.

Of late years the sites of the great cities of the Persian Empire have been dug over, and wonderful remains have been found and studied. At Susa, the ancient capital of the Elamites, and at Ecbatana, the great city of the Medes, are found remains of splendid palaces built by Darius and his successors.

From countries round the Indus River the Persian Empire stretched to the Caspian and Mediterranean seas, and far into Egypt, where Darius improved or built a canal from the Nile to the Red Sea. Great roads connecting the various provinces, bridges, inns and watch-towers were built by his orders, and a royal post was established. Darius also made his way across the Bosphorus into Europe, and across the Danube, extending the boundaries of empire and paving the way for further conquests in the west.

**THE SOLEMN WORDS REPEATED
TO DARIUS AT HIS FEASTS**

For a great struggle was coming on. The provinces in Asia Minor which Cyrus gained for the Persian Empire were peopled by Greeks from over the sea of many islands. These people loved freedom and hated the government of an absolute monarchy. By degrees discontent led to rebellions; rebellions to savage punishments and threats of vengeance. Particularly angry was Darius with the Athenians, who had not only

dared to help their fellow-countrymen across the sea, but had refused to submit in any way to the great king.

While he was nursing his plans to make himself absolute master of the revolted states, and of Greece, and perhaps of Europe beyond, it is said that he had these words said to him three times a day, when he sat at his luxurious feasts: "Master, remember the Athenians."

There was furious fighting with the Greeks of Asia Minor, whose cities were burned and whose people, often quarreling among themselves, were overcome by the huge numbers of the army of Darius.

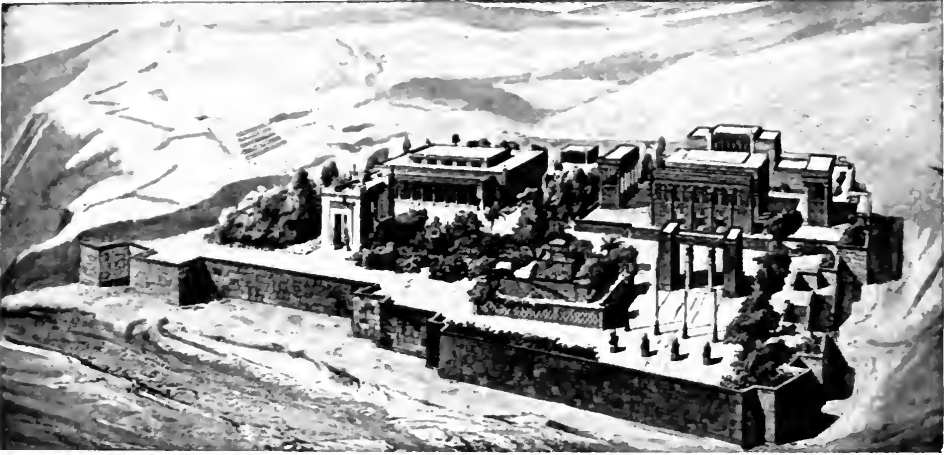
Then Darius remembered the Athenians. He sent an immense army, gathered from all the countries of his empire, under his son-in-law, and they marched over a bridge of boats, as Darius had done before when he went to conquer the Scythians on the Danube. They expected to make short work of the enemy, but the rough seas wrecked their ships, food ran short, and the men of Macedonia and Thrace resisted successfully.

But Darius, with his great wealth and resources, soon fitted out another expedition. This time it sailed across to Greece in six hundred ships and landed only a few miles from Athens. It was an awful moment for the Greeks. Great was the excitement, terror and dismay. But though there were ten times as many Persians as Greeks in the battle of Marathon which followed, the Greeks won the day and drove back the Persians to their ships. So a second time the Persians had to return home without any glory.

**THE GREAT ARMY OF THE SOLDIERS
OF FORTY-SIX NATIONS**

Darius was more furious and determined than ever when the news of Marathon came to him, and he vowed to take no rest till the Athenians were dragged in chains to Susa. But in the midst of his plans Darius died, and his son Xerxes succeeded him. That handsome gay young man cared more for pleasure and an easy life than for warfare, so that it seemed at first as if the conquest of Greece might be given up. But in the end he was persuaded to continue his father's work, and enormous preparations were made for the invasion. It is said that as many as forty-six nations sent their best soldiers, men of all colors—black Africans and tawny and white natives of far-distant parts of Asia. And

THE GOLDEN CITY OF THE PERSIAN KINGS



This is how the palace of Darius at Persepolis looked in the days of its glory. The ancient writers tell us that no other city could be compared in beauty with Persepolis, "the glory of the East."



The enormous treasures gathered at Persepolis were obtained by oppression and extortion such as few empires have ever practiced. Here we see a Persian king receiving tribute from conquered peoples.



Not far from the ruins of ancient Persepolis are some wonderful rock tombs, each carved out of the solid stone, with the face of the rock sculptured to represent a temple or palace. Some of the niches where the bodies of kings were laid are now used by tribesmen as store-places for their grain.

these soldiers, with their diverse clothing and arms, passed to the war on foot, on horseback, on elephants, on camels and on ships.

Xerxes was in the midst of the host himself, with an immense following of servants and courtiers, surrounded by every sort of luxury that enormous wealth could provide. How changed was all this from the days of his poor and hardy and successful forefathers! It took the army seven days and seven nights to cross the double bridge of boats across the Dardanelles. What a prospect for the Greeks! They heard with terror of this multitude moving ever steadily onward to overwhelm their small country and its small army; especially as at that time there was so much jealousy among the states that it seemed impossible to get them to act together. The Persians had to pass a ridge of high mountains which protected Athens to the north, and between the bog on the edge of the sea and this high ridge there was a pass near some hot springs. This was the pass of Thermopylae.

A MIGHTY GREEK EPIC AND ITS FADING GLORY

Here was fought one of the best and bravest fights in history, one of the few fights where failure was in effect a never-dying victory. A few Greeks held the pass through two days and nights against the hosts of Persians and Medes. These were slain in heaps as they rushed on the solid wall of Greek spears. But a traitor told the Persians of another pass in the mountains, and led the army round by it in the darkness. Some of the Greeks went away; but the little band of Spartans, under Leonidas, determined to conquer or die, and made a final stand, surrounded by overwhelming numbers. All of them were shot down by Persian arrows to the last man. And so Xerxes reached Athens.

Nearly all the inhabitants had fled. He killed the remaining few hundreds, and set fire to the fine buildings, and then marched on to witness the great sea-fight from a hill looking over the Bay of Salamis. No doubt he felt quite certain that his splendid fleet of over a thousand ships, well equipped and manned, would make short work of the small Greek fleet, which numbered only about 300 vessels.

As the day wore on Xerxes became more and more uneasy, and at last started up from his lofty throne, which was car-

ried round with him, in wrath and dismay, as his thousand ships crowded and jostled together in the narrow mouth of the bay, so that many were run down and sunk. Again and again the loud battle-cry of the Greeks came up to him as they dashed their brazen prows into the ships nearest them, and boarded one after another with the help of their long spears.

HOW THE GALLANT GREEKS DROVE THE HUGE ARMIES OUT OF EUROPE

Xerxes raved like a madman before night as he saw his ships, squadron after squadron, turn and sail out to sea. Soon he, too, ran away homeward, and left his general behind with three times as many men as the Greeks could gather, to finish the campaign later. A few months after, this remnant of the great host was destroyed and scattered at the battle of Platæa. And so ended the great Persian wars in Europe, when gallant little Greece for twelve years withstood the largest armies the world had ever known.

Artaxerxes, one of the sons of Xerxes, comes into a Bible story, for he had a Jewish cupbearer, Nehemiah, who was allowed to leave his duties at court and go to help his brethren to rebuild the walls of Jerusalem and reorganize the government of the state.

In the reign of Darius II, another of the sons of Xerxes, Persia lost Egypt, which it had held, in spite of many rebellions, for more than a hundred years. There were other signs that the great empire was beginning to break up.

THE YOUNG KING WHO HIRED GREEK SOLDIERS TO FIGHT HIS BROTHER

Among these signs were dark plots and quarrels between the nobles and princes, which came to a height when two of the sons of Darius II were struggling for the throne. Cyrus, the younger, knowing that Greek soldiers were better than the troops gathered together from different nations in Asia, paid thirteen thousand Greeks to come and help him fight against his brother. Cyrus was slain and his army defeated near Babylon. The Greeks, now reduced to ten thousand men, fought their way back to the coast amid difficulties under the command of Xenophon, the historian.

For a time Persia revived under a strong king, Artaxerxes III, who subdued Egypt again, and put down many rebellions, but from him the kingdom passed to Darius III, one of the weakest and

TWO CONQUERING KINGS OF PERSIA



Xerxes I gathered a vast army for the invasion of Greece, and built a bridge of boats a mile long across the Hellespont, which is now called the Dardanelles. When the stormy waves broke his bridge, he ordered three hundred lashes to be given to the rebellious sea. Here we see the king crossing the Hellespont.



When Cyrus the Great conquered Babylon, he restored to their own land the Jews whom Nebuchadnezzar had carried away captive, returning to them, as shown in this picture by Cyrus, the golden and silver vessels from their destroyed temple, that they might be used in the new temple which Cyrus ordered built.

most unfortunate of rulers. And he had to meet one of the greatest generals the world has produced, Alexander the Great of Greece. Alexander, in the course of his march across Asia to India, met and defeated him and destroyed the Persian Empire.

After Alexander's death his empire was divided between his generals, and one named Seleucus, about 312 B.C., became the Greek king of an independent Persia. Presently, however, a new body of invaders, of the same stock as the Medes and Persians, called Parthians, entered the country from the north, and ruled there for four hundred years. However, about six hundred years after the conquest of the Persians by Alexander the Great, the Persians threw off the yoke of the Parthians, and a Persian king of the old royal line, named Artaxerxes, founded a real Persian kingdom afresh.

The Persian kings of this line are often called the Sassanian kings. They again raised Persia to greatness. The Parthian idols were cast away; the magi, or wise men, who taught the ancient faith of Zoroaster were gathered together at Persepolis, and the sacred writings, or Bible, of the Persians, called the Zend-Avesta, was written, and some very beautiful teachings are contained in it. So successful were the Sassanian kings in war that by the year 628 their armies had reached the Bosphorus, within a mile of Constantinople, and the Eastern Empire was in the greatest danger from them. But the end of their dynasty came in 639, when the Arab Mohammedans, marching to war in the cause of their religion, overthrew the Persian power.

THE FAITHFUL ZOROASTRIANS FORM A NEW HOME IN INDIA

The Persian religion was now changed by the Mohammedan rulers, though a few fire-worshippers remained. A number emigrated to India and settled at Bombay, where they are known as Parsees, and are still faithful to their ancient creed.

The Arab Mohammedans, who ruled sometimes in Bagdad and sometimes in Damascus, and whose chiefs were known as the caliphs—the greatest of them being Harun-al-Rashid—were much attached to the fertile parts of Persia. But a change was at hand. New invaders swept down on Persia from central Asia, a branch of the Turkish race, and displaced the Arab caliphs both in Persia and Arabia, and

ruled from Afghanistan to the Dardanelles.

The Turks had been worse than the Arabs, but their successors were worse than the Turks. These were hordes of Mongols under Jenghiz Khan, who in the thirteenth century terrorized the world. Persia was conquered, Bagdad taken, and the library of the caliphs was burned.

A generation later another Mongol horde under Tamerlane burst over the country, and preyed on it so that its prosperity became only a memory. However, in the year 1500 a new ruler arose in western Persia, and, taking the old title of Shah, formed a national government, and reduced the Mongols to submission. He is looked upon by Persians as the founder of modern Persia. His name was Ismail. He engaged in war not unsuccessfully with the Sunni sect of Mohammedans, and so is specially venerated by the Persians, who, like him, are of the Shiah sect.

THE GREATEST PERSIAN RULER IN THE COUNTRY'S MODERN HISTORY

Some strong shahs follow, particularly Shah Abbas I, the Great, who died in 1628. He it was who built and beautified Isfahan as his capital. A wise monarch, he paid great attention to trade, and ruled from Afghanistan to Armenia.

His successors, however, failed to imitate his toleration in religion, and attempts at persecution led to religious warfare, during which the Afghans captured Isfahan, and one of them, Mahmud, succeeded to the throne. Generally speaking, the government of Persia during the nineteenth century was feeble, and order was nowhere insured.

Up to 1906 the shah remained an autocrat, checked only by the chief doctors of law living at the places of pilgrimage of the Shiah Moslems, Najaf and Kerbela, in Mesopotamia. But in 1906 a constitution was drawn up to enable a representative government to be formed. Since then a National Assembly, or Majlis, has met several times, but the government of the country is carried on by a cabinet acting through the governor-generals of the thirty-three provinces. Every town has a magistrate and each quarter of a town and every village a chief.

Persia has a new importance to-day in her reserves of oil in the regions adjoining Mesopotamia.

THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 1069.

PICTURESQUE SURVIVALS OF ANCIENT PERSIA



The supposed tomb of Esther, wife of King Ahasuerus, and Mordecai at Hamadan.



One of the city gates of Kerman.



The grand mosque at Isfahan.



A quaint bullock cart that may be seen to-day on the roads of Persia.

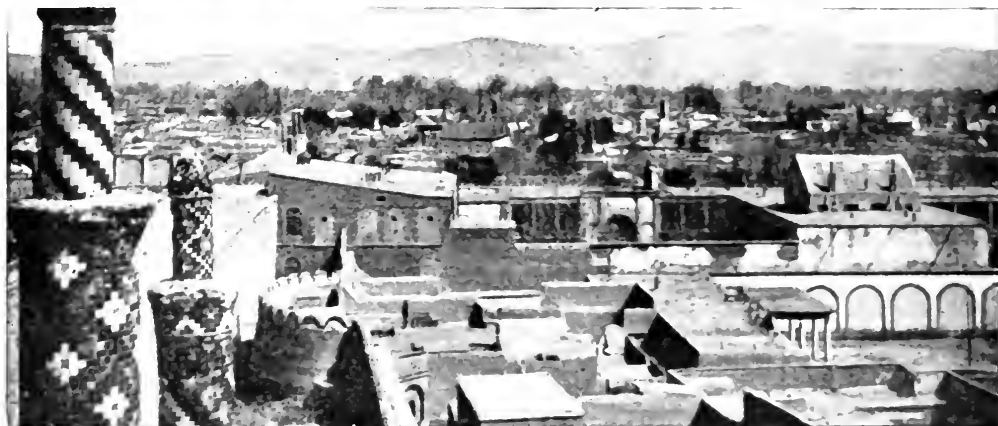
TWO OF PERSIA'S LARGEST CITIES



The square towers and flat roofs of Yazd against a background of hills.

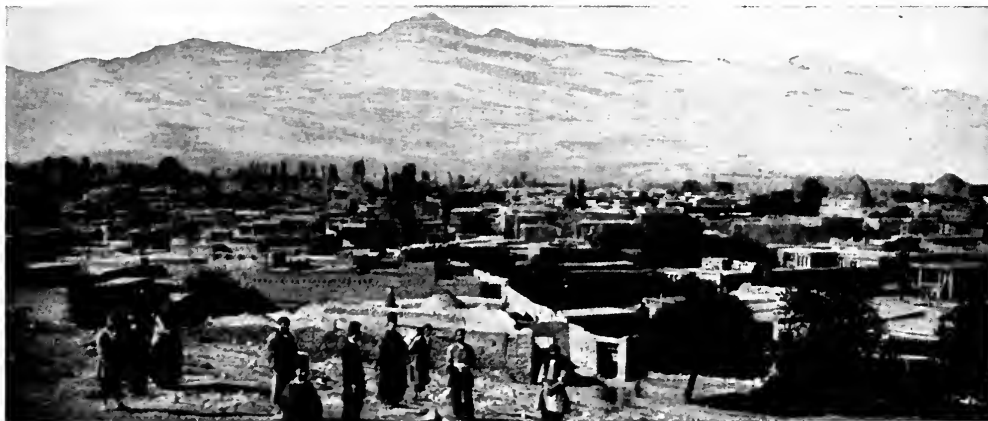


Two of the beautiful gates leading to the ancient city of Teheran.

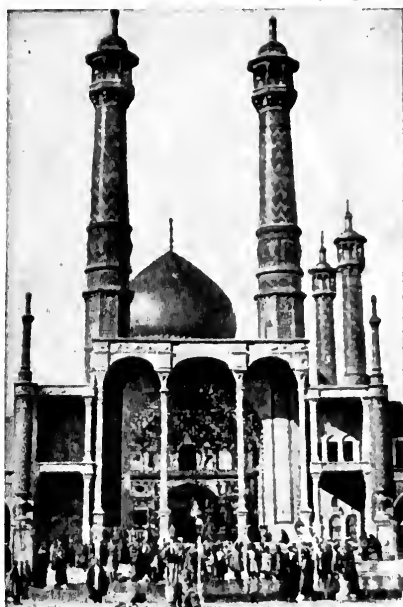


Looking down from the hills upon Teheran, the capital of Persia.

HOUSES, MOSQUES AND BRIDGES IN PERSIA



The city of Hamadan, capital of the Province of Hamadan, has beautiful gardens.



The mosque known as Fatima's Shrine at Kum.



The Minar at Damghan.



The entrance to the governor's house at Shiraz.



A very ancient bridge at Resht, capital of the Persian Province of Gilan.

DIFFERENT TYPES OF PERSIANS



A lady in indoor costume.



A Persian scribe.



A peasant girl of Shiraz.



Where the beautiful Persian rugs come from.



A band of little water-carriers bearing the ancient vessel.

WHERE ANCIENT TYPE PERSISTS MOST STRONGLY



A Persian mullah, or teacher.



Kurdish women of the uplands.



Typical old Persian merchant.



Primitive methods of agriculture still in use in Persia.



A devout Persian at prayer.



Two Persian dervishes.



A writing lesson.

Photos, Church Missionary Society, the E.N.A., Mr. Avezathe.

GATHERING SALT FROM THE SEA



There are three chief sources of salt. Some is obtained by evaporation from the sea, some by digging rock salt from mines, some by pumping brine out of the earth. There is a salt field in the south of Europe, where the sea has been let into shallow beds. As the salt is deposited workers rake it out of the brine.



In this picture we see the huge evaporation pans on the shores of the Mediterranean at Benghazi in Tripoli. The sun having done its work and taken up the moisture, thousands of tons of salt are left behind.

The Book of Familiar Things



Covering a heap of salt with clay to protect it from the rain.

A GRAIN OF SALT

SCATTERED here and there throughout the universe are two elements called sodium and chlorine which are very fond of each other. Sodium is a curious soft metal which can be cut with a knife, and is very difficult to keep pure; chlorine is a colored gas which causes certain death to any kind of living creature if breathed in large quantity. It was the first of the poisonous gases used with such deadly effect in the World War, and some of the biggest makers of the gas were the salt-manufacturers. But when sodium and chlorine unite, one atom of each with one of the other, they make a compound called sodium chlorid, or common salt; and this is the salt of the earth.

It is the most abundant salt in seawater. It is also very common in places where salt water has been in days gone by. Even in our rivers and streams a certain quantity of this salt is found; and, moreover, salt plays a part in the body of every living creature.

When there is a very great deal of salt in any place it interferes with life, and that is why salt is used to preserve things from the action of germs which would make them go bad. Salt is invaluable for this purpose and is often used in connection



with the preservation of food. But even when the proportion of salt is less, it serves the purposes of life. All life is lived in water, but we may go a step farther than that and say that all life is lived in salt water. So we must have salt in our food.

Salt and other compounds of sodium are to be found everywhere, and wherever salt or any compound of sodium exists, and is made hot, it gives forth a special kind of yellow light.

By passing any light through a prism we can clearly detect the bright yellow lines that mark the presence of salt, or, rather, the sodium in the salt. It is only natural, then, to turn our attention to the light that reaches us from the sun and the stars, and no sooner do we do so than we find that the stuff which is in our bodies, which fills the sea, which even forms a sort of rock upon the earth, is also abundant in the sun and in many of the stars.

The salt in the sea has been accumulating for millions of years. Every mountain worn down by rain and river since the earliest days of the earth's crust has given the salt of its rocks to the oceans, and miles and miles deep of sea-mud have yielded enormous quantities of salt—quantities so prodigious that it is

difficult to realize them. It has been calculated that in every cubic mile of sea-water there are a million tons of salt, and that altogether there are from four to five million cubic miles of salt in the sea—enough to cover the whole surface of the world four hundred feet deep. This would be something like fourteen times all the solid land of Europe above sea-level. With the salt of the sea we could build up all the mountain ranges of the world.

A CITY OF SALT WITH CATHEDRALS AND DANCE-HALLS

The amount of salt is one of the means by which we measure the probable age of the earth. Geologists have calculated that it must have taken many millions of years to produce all the salt which is in the sea, and where seas and salt lakes have dried up we find deposits proving that these figures are not exaggerations.

In Germany and Poland there are deposits of salt that have been pierced to the depth of 4,000 feet without reaching bottom; in England there are deposits 500 feet deep. In the Polish salt mines of Wieliczka galleries and tunnels have been hewn out for 65 miles in salt, sometimes more than a thousand feet beneath the surface; in fact, there is a great underground salt city, with elevators and staircases and streets and railway stations, with cathedrals and dance-halls and salt lakes and salt rivers. A traveler who explored this truly white city some years ago describes "winding streets and dim scintillating alleys; pillared churches, diamond and ruby staircases, restaurants, railway stations, shrines, statues, monuments, and a thousand other wonders—all rough-hewn in the hard, sparkling rock-salt crystals, which, lit by electric lights, pine torches, magnesium flashes, or thousands of candles, fairly blaze like a world of precious stones."

MILLIONS OF BARRELS OF SALT USED IN AMERICA EVERY YEAR

When we think of all these great excavations, and the number of great salt mines in the world, we wonder where all the salt can go. But "many a little makes a mickle," and though each European consumes only about half an ounce of salt a day, there are 365 days in the year and the population of Europe is hundreds of millions, so that

the total consumption is very large. In America alone there are millions of barrels of salt used every year, and the salt production of the whole world amounts to more than thirteen million tons. Of course, it must be understood that all this is not consumed as food; much is used for chemical purposes; great quantities are used for preserving fish, butter and meat, and not a little is wasted.

Such a tremendous use of salt suggests that salt is an article of food necessary to health and vigor, and so it actually is. An animal with insufficient salt in its food grows feeble, and with no salt at all dies. In Holland one of the legal punishments used to be to deprive a man of salt, and the deprivation caused depression and illness. Criminals in Sweden were once allowed, as an alternative to capital punishment, to abstain from salt for a month, with the result that they sometimes died before the end of the month. During sieges and famines lack of salt always causes suffering and ill-health.

CHILDREN WHO PREFER A LUMP OF SALT TO A LUMP OF SUGAR

Those who eat meat raw require less additional salt than those who eat it cooked, for in the cooking the natural salt in the meat is dissolved and washed out. So vegetable feeders require more salt than meat-eaters, because vegetables contain little salt. All animals need salt, and many domestic animals suffer through lack of it. Wild animals instinctively seek it out, and find salt pools or salt rock, and often travel great distances to reach them. Of course there is such a thing as eating too much salt. It is also true that meat and fish preserved by salt are generally not so digestible as when fresh. They lack certain things which fresh meats have.

Nowadays salt is cheap and common, and we take it as a matter of course and do not recognize its importance; but in ancient times it was offered as a precious thing to the gods, and there were even wars waged to obtain salt springs. Even now natives of Sierra Leone are willing to sell their wives and children for salt, and there are parts of Africa where children prefer a lump of salt to a lump of sugar. The word "salary" shows the great value of salt, for it comes from salt, and in its original sense it indicated

that the money was given to buy salt—a soldier's salt money was his salary.

All our tissues require salt, and the blood in our veins can be replaced to a certain extent by a solution of common salt. Indeed, there is more in a grain of salt than some of us imagine as we take it lightly every day.

HOW IS SALT OBTAINED FOR OUR USE?

A great deal of salt used in the world is taken from the water of the sea, or of salt lakes. In some places the salt deposit is found on the surface of the earth, as in the Great Basin. Sometimes it is dug from mines; but although there are some famous salt mines, they supply us with only a small proportion of our salt. Often the deposits are so deep down in the crust of the earth that it is easier to pump the salt up in the form of brine, either from natural springs of water which have passed over salt deposits far below, or by pumping fresh water into a well and bringing it up again after it has become saturated with the salt it has dissolved.

HOW SALT IS MADE FIT FOR OUR USE

In most cases, then, salt first comes in the form of brine; that is, it is mixed with water, which must be evaporated. The simplest way of doing this is by the heat of the sun, or solar evaporation. Water from the sea or a salt lake is led into a series of shallow pools, where it evaporates, leaving the salt behind. The salt is then raked into heaps, and as soon as it is dry, it is ready for market. This method of making salt has been known since man first discovered the crystals on the edge of a rocky pool and it is still in use in many places. Much salt is made in this way in some of the countries of Europe and Africa around the Mediterranean, and also in Asia and in some parts of the United States. Large quantities of salt are gathered from lagoons on the southern shore of the Caribbean Sea. This, of course, is the cheapest way of making salt. But the salt so made is never free from impurities.

An improvement in salt-making came when someone thought of evaporating the water by boiling it. This method is called the pan-drying process and consists in boiling the brine in large shallow pans built over furnaces. As the water

is evaporated by the heat of the fire the salt sinks and is raked out on to draining-boards in front. Most of it is then carted away to storehouses to dry, but the salt intended for use in food is put through a special process.

This simple process has been improved by an invention by the use of which hot air from a closed-in furnace is carried along under the pans, and as the heat under the pans near the furnace is greater than under those farther away, salt of different degrees of fineness can be made, and grinding is not necessary.

On this continent, however, the methods known as the grainer and vacuum processes are those chiefly used. Salt-making establishments are usually called salt blocks. In the grainer process, brine is pumped into cisterns, from which it flows into large tanks called settlers, which are provided with steam pipes to heat the brine. In the settlers it loses such things as gypsum and iron, and then, if coarse salt is to be made, it goes on to the grainers, shallow vats or tanks with steam pipes running through them.

THE VACUUM PROCESS FOR MAKING FINE SALT

The vacuum process is a late invention for the making of very fine salt in what are called vacuum pans. The vacuum pans are tall tanks from which most of the air has been withdrawn and in which copper steam pipes are fixed. Brine from the settlers is brought into these pans, which are kept by the steam in the pipes at a temperature of about 150° Fahrenheit. This is not a very high temperature, but it has been found that in a vacuum brine boils violently and forms very fine crystals at this point. As the salt crystals drop to the bottom of the pan they are drawn off to be dried. In some places the salt is taken at once to a rotary kiln, or drier, which has steam pipes down its centre and is laid at a slight slant. As the kiln slowly rotates, the salt slips down its length, drying as it goes, and when it reaches the lower end it is ready to be passed through screens into bags.

In a newer method the salt drops from the vacuum pans into a rapidly revolving drum called a "centrifugal." It is so called because in this nearly all the moisture is flung out by centrifugal force before the salt reaches the kiln.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 1053.

SHOVELING THE SALT INTO HEAPS



This is a general view of a salt field in Russia. In the background can be seen vast tanks full of brine, and in the foreground stacks of salt recovered from the brine. The beds are arranged on a gentle slope.



In Russia most of the work of collecting the salt from the crystallizing beds is done by women, who shovel it into small piles, as seen here, and then into great stacks, each containing hundreds of tons of salt.

THE BIGGEST SALT MINES IN THE WORLD

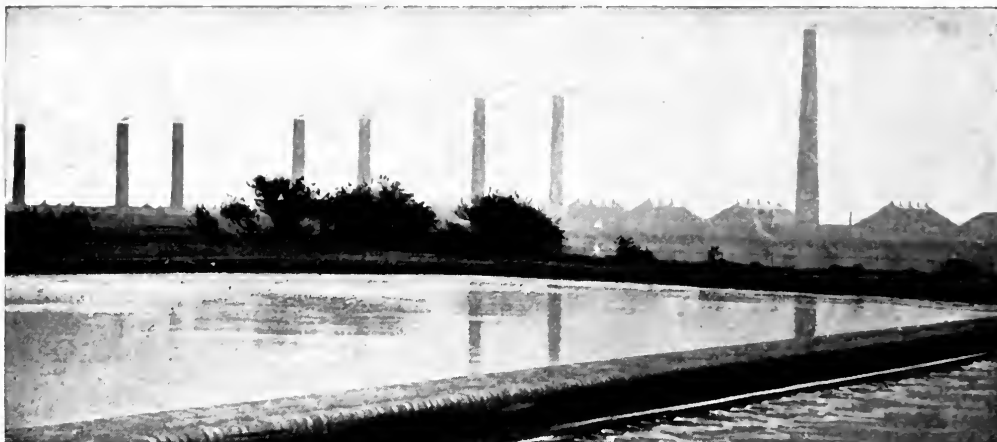


As the rock salt is hewn out of the wall of this Wieliczka mine it is carried away on cars drawn by ponies, many of which are blind. Two thousand men work in the mine day and night, and the mine, which is lighted by electricity, is a sort of underground city. It has been worked since the thirteenth century.



This is the chief shaft of the great salt mine at Slanic, in Rumania. Up this shaft every year come eighty thousand tons of rock salt. The floor of salt in the mine is lowered between six and seven feet every year.

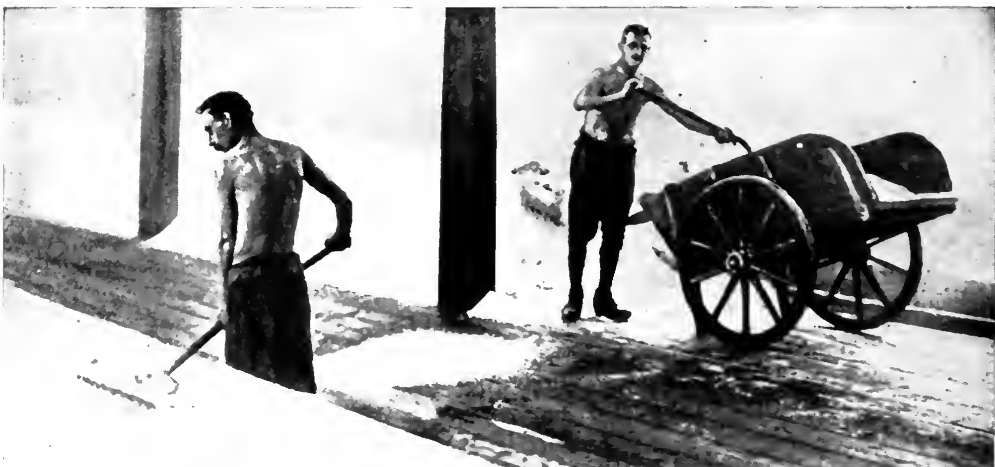
PREPARING THE SALT FROM THE BRINE



In Staffordshire a bed of rock salt 78 feet thick lies under the ground with brine on top of it. The brine is pumped up into great reservoirs which hold a million gallons of brine, ready for evaporation.



The brine is then run into huge pans, which are heated either by furnaces underneath or by means of steam, and as the water is driven off by evaporation the salt is left as a crystallized deposit on the bottom.



The evaporating pans are large, shallow iron vessels, and the greater the heat the finer is the salt that is formed. A low heat produces coarser salt. The salt forms on the surface, sinks, and is raked out.

PLOWING UP SALT IN THE DESERT



When a fine salt is required for the table the heat is made greater so as to increase the rate of evaporation, and the brine in the evaporating pan is stirred to prevent small crystals getting an increase of deposit on them and growing large.

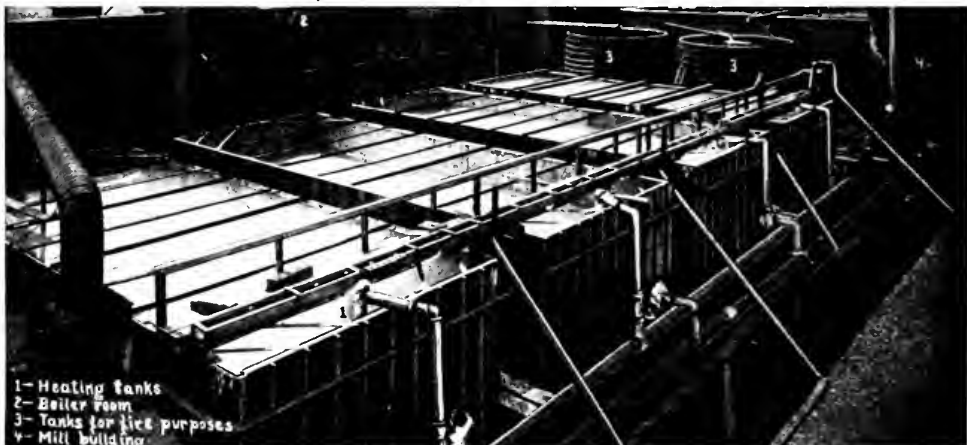


In America much salt is obtained from deserts where, long ages ago, salt water evaporated, leaving the salt behind in great deposits. Here we see the plowing-up of desert salt in California.

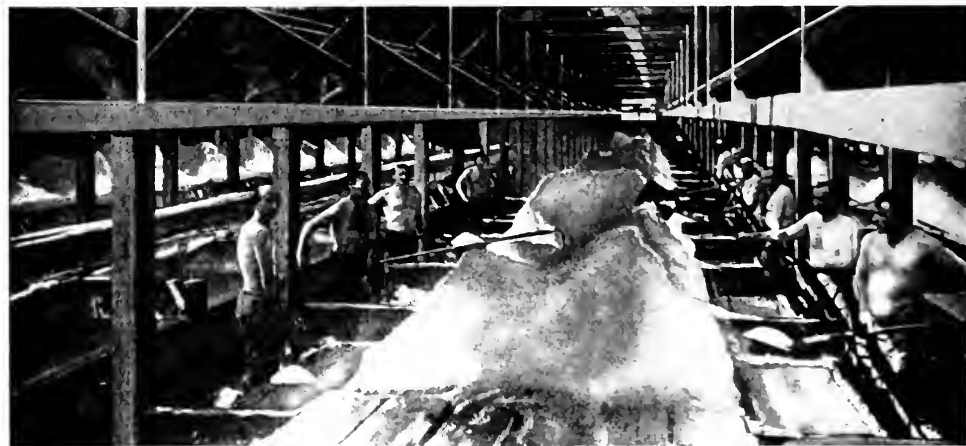
HOW SALT IS MADE FROM WELLS



This picture gives us the beginning of the process of making salt from brine drawn from deep wells. The low buildings, marked 2 in the centre of the picture, are the settlers of which we read on page 927.



Here we have the heating tanks which in some places are used in addition to the settlers. In these the brine is heated, and heavy impurities, such as gypsum and iron, which would hurt the salt, are removed.



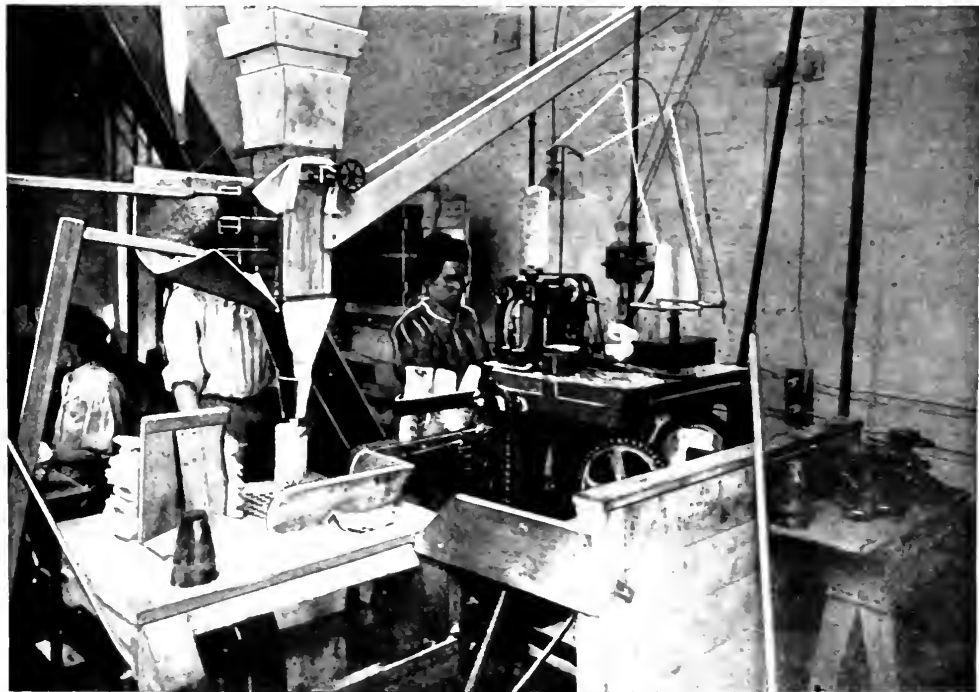
In the next part of the process, the hot brine is allowed to flow into grainers—shallow tanks in which it is heated by steam until it reaches a temperature high enough to crystallize the salt.

MACHINERY THAT MAKES FINE TABLE SALT



This is the top of a vacuum pan, in which brine is boiled very rapidly to make salt with fine crystals. The pan is a tall cylinder about 50 feet high and 9 feet in diameter. Salt boils in a vacuum at a much lower temperature than in the air.

Each vacuum pan, such as that on the left, can produce daily over 100,000 pounds of salt, which is drawn into this slowly revolving pipe or kiln to dry.



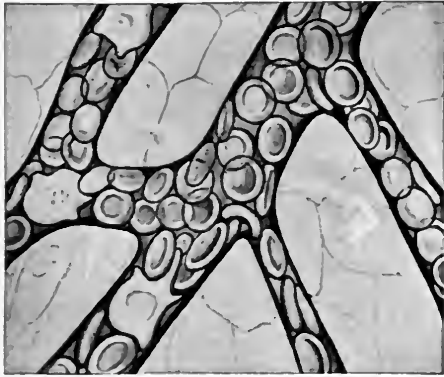
The kiln shown in the picture above rotates slowly, and as it is set at a slant the salt slips down through it. When the end of the pipe is reached, the dry salt drops down through the little chutes, shown here, into bags held ready for it. The bags are then neatly stitched up, and the salt is all ready for market.

THE WHITE CELLS FIGHTING FOR A LIFE



HOW TYPHOID-FEVER GERMS INVADE THE BLOOD AND ARE RESISTED BY THE WHITE CELLS

In this picture is seen a deadly battle in the blood between microbes of disease and white blood-cells floating in the blood-stream. Swarms of typhoid germs are seen invading the blood, and the white cells are mobilized to resist the invaders. Each white cell has swallowed several germs, and if cells can swallow and digest the germs fast enough, they will win the battle. Sometimes the germs win.



The first picture shows the red and white cells in the capillaries; the second shows white cells and germs and a white cell eating a germ.

THE WHITE CELLS OF THE BLOOD

THE white cells in the blood are very few compared with the red cells. A volume of blood equal to two pinheads, which should contain some four or five millions of the red cells, should contain only a few thousand white cells. In many kinds of illness, however, the number of white cells greatly increases; perhaps five or even ten times. Doctors used to think that this was one of the bad things about the illness, but now we know better. It happens because the white cells are specially useful in illness, and this is one of the ways in which the healing power of nature shows itself.

These white cells vary a good deal, unlike the red cells, which are all of the same pattern. They vary in size, in the way they stain with various coloring matters, and so on. Perhaps all these different kinds represent different stages in the history of their lives. They have no elastic coat, but they can, and do, change their shape readily.

For many years it was a great puzzle to find out any use for these white cells. Then many curious things began to be noticed. White cells were seen with microbes inside them, and at first it was thought that the microbes had invaded the cell and were killing it; but then white cells were found with little specks of coal-dust in them, which the

cells must have picked up for themselves. Then we learned how to keep

a drop of blood warm under the microscope, so that we could watch the white cells for hours at a time; and it was found that those which had microbes in them did not die, and that after a time there was a disappearance of the microbes.

Then we found that we could actually see the white cells picking up microbes or specks of any foreign matter in the blood and dealing with them just as the ameba deals with anything that it is feeding on. Nor was this all. By studying the blood-vessels of a living tissue under the microscope we discovered that the white cells have a way of passing through the walls of the blood-vessels and wandering about in the body generally. This is now usually called their "emigration."

Suppose there has been a little damage to your finger; perhaps some dirt and some microbes have got into the wound. We find that the white cells make their way through the blood-vessels in the neighborhood of the injury, not singly but in thousands. They can be watched doing so, and we find that it may take perhaps as long as half an hour for a single cell to make its way through. There they gather round the wound.

Meanwhile, if it is at all a serious injury, in some wonderful way the whole body seems to be told of the fact. The various organs which make these white blood-cells are urged into unusual activity, so that if we count the white cells in a drop of blood, we may find them greatly increased. The cells that emigrate to the place where the damage is, attack the microbes, and in nearly every case they are victorious, killing the microbes and eating them up.

It is by this means that we recover from such an injury. If you have ever had a poisoned finger, it was the white cells of your blood that enabled you to recover; it was they that killed the attacking microbes which had got into your finger. They die in tens of thousands when they do this. The creamy sort of stuff which we sometimes call "matter," which the doctor sometimes has to let out of a poisoned finger, is largely made up of the dead bodies of these little soldiers. They have died to save the body they belong to.

ONE OF THE MOST INTERESTING STORIES IN THE BOOK OF LIFE

The white cells, then, which were so long a puzzle, now provide us with one of the most wonderful stories that can be read in the whole book of life. They are the defensive army of the body against living enemies from outside, as also against foreign particles that are not alive. They have often been described as the scavengers of the body, or as its police.

So far as we know at present, during a considerable part of our lives they have very little to do. They always have to be in readiness, like soldiers or police or the fire department, because at any moment something may happen which needs their attention. It seems quite clear that our recovery from all infectious diseases is due to these little white cells. When we get better from inflammation of the lungs, scarlet fever, measles, whooping-cough, chicken-pox, and so on, it is not the doctor who has made us well, but it is ourselves, acting mainly through our white blood-cells. What the doctor can do, and does, is simply to put us in the best possible condition so that we may be able to cure ourselves. If our blood is healthy and free from such poisons as alcohol, the white cells will destroy many disease germs.

Long ages ago great men wrote and

spoke about the healing power of nature. Every day we study the body we learn more and more to respect and understand this healing power. If we come to think of it, life has always had enemies to fight—changes of temperature, accidents of a thousand kinds, the attacks of other kinds of life, things that were poisonous to life, and so on.

THE GREAT WONDER OF THE WAY IN WHICH NATURE HEALS US

Therefore, from the very first it has been necessary for living creatures to learn how to recover from injury. If every injury were to leave damage that remained, life could not have gone on. Throughout the ages this power of recovery must have been increasing, and perhaps, on the whole, it is greater in man than in any other creature.

We know the existence of disease and death and accident, and we see the evidence of much injury that cannot be repaired around us; but we ought not to forget how much injury, how many accidents, how many risks of poisoning, are made right by this healing power of nature. We can take a drop of blood from a patient who is recovering from an infectious disease, and can see the white cells eating up the microbes in that blood—can practically see what is happening in his blood at that moment. This is far from being the only means by which the body protects itself, but it is perhaps the most wonderful.

THE WONDERFUL THINGS THAT HAPPEN WHEN YOU HURT YOUR FINGER

Another thing that the story of these white cells teaches us is the wonderful unity of the body. The least little injury—a little dirt or the tearing of a finger-nail—and the whole body seems to know at once. The spleen, which is far away inside the body, and tiny little glands lying under the skin of the neck and in the armpit, are all informed, probably by means of chemical messengers sent them from the injured part. At once they begin to double or treble their activities and produce millions of white cells—all because the tip of a finger is in trouble.

The carrying of messages is one of the great services of the blood; it not only carries oxygen and food, and the soldiers—or should we call them the sailors?—of the body, but messages and messengers, too. Nothing happens in any part of the body without producing chemical changes,

and the compounds which are the results of these changes get into the blood, and are carried by the blood-stream to do their work. We hope that some day nations may be as beautifully and unselfishly ordered as the human body is.

HOW ALCOHOL DESTROYS THE POWER OF THE LITTLE WHITE SOLDIERS

The white cells are much affected by many things in the course of our lives besides the occurrence of damage or danger. Large numbers of them enter the blood when we digest a meal. We do not yet know why. But we have learned that a great many drugs, many of which were supposed to be useful, paralyze the white cells so that they cannot do their work. This is one of the chief reasons why most doctors are nowadays giving much less medicine than they used to give. They are learning to trust more to the healing power of the body itself, and they will not take the responsibility of giving things which simply interfere with that healing power and perhaps do nothing else.

One of the things that have marked action in this respect is alcohol. In the presence of only tiny quantities of this substance the white cells cease to move and will take no notice of microbes which, if the alcohol were not present, they would eat up at once. This explains why men and animals who have been given alcohol do not recover from infectious diseases so often as those who have had no alcohol given to them.

Besides the red cells and the white cells there are other tiny little bodies connected with the blood. They are very tiny, round and transparent, and are called the blood-plates. Blood-plates do not exist in the circulating blood. They occur as a precipitate when the blood is shed, and are concerned in the early stage of clotting.

THE GASES THAT HELP TO MAKE UP OUR BLOOD

That is all we need say about the solid part of the blood. We still have the liquid part and the gaseous part to study. There is much less to say about the gaseous part, but we shall take that first because it goes with what we have said about the duties of the red cells.

The most important gas in the blood is, of course, oxygen. Of this very little is found in the blood in the veins which is going to the lungs, but much in the blood that is coming from the lungs. Nearly

the whole of it occurs, however, not as a gas, in which state it would take up far too much room, but combined with Hb to form HbO_2 , as we have seen.

A good deal of nitrogen is always dissolved in the blood, to which it has gained entry from the air in the lungs. It serves no purpose and does nothing of any kind. Without compounds of nitrogen in our food we should die, but it is only certain kinds of humble plants that can take simple nitrogen and combine it. The animal world, including ourselves, depends on them for its nitrogen compounds.

There is one other most important gas that is always found in the blood. This gas is carbon dioxid, the molecule of which consists of one atom of carbon and two of oxygen, so that we write for it CO_2 . This is a constant and continuous product of our bodies, just as it is the product of the burning of a fire.

WHY NONE OF US CAN LIVE FOR A MOMENT WITHOUT SALT

If a fire does not get rid of its carbon dioxid, it will be choked, and the same is true of ourselves. There are thus two great differences, and not one, between the blood that runs to the fingers and the blood that runs back from them. The blood that runs to the fingers is rich in oxygen, as we have seen, but contains scarcely any carbon dioxid; the blood that comes back in the veins is poor in oxygen, but rich in carbon dioxid, which it is carrying to the lungs, where we get rid of quantities of it every time we breathe out. There is such a quantity of this carbon dioxid to be carried back from the tissues to the lungs that it could not be packed away in the blood in its gaseous form, and so, just as the oxygen has to be combined with something and packed away in HbO_2 , which is really a solid, so the carbon dioxid has to be combined with something.

It seems, however, that neither the red blood-cells nor the white, nor the blood-plates, have anything to do with this. It is mainly done by one of the precious salts which are always to be found dissolved in the fluid part of the blood. There is a large number of these salts, all of which are necessary to our lives, and therefore necessary parts of our food. Most, if not all, of them are similarly found in the blood of all creatures that have blood and in the body-fluid of those

which have no blood. The particular salt which carries the carbon dioxid dissolved within itself from the tissues to the lungs—or, at any rate, carries much the greater part of it—is called *sodium carbonate*, and though we may not have heard the name before, we have all heard of washing-soda, and that is the same thing.

Now, sodium carbonate itself is a compound of the metal sodium and carbon dioxid, but there is another salt which is nearly the same, only it contains two doses, so to speak, of carbon dioxid instead of one in each of its molecules. This salt is called sodium bicarbonate, *bi* simply meaning “two.” Now, we also know sodium bicarbonate quite well, for it is none other than what we call baking-soda. Outside the body, when we study these two salts, we can observe that under certain conditions the simple carbonate will take up carbon dioxid and become bicarbonate; and in other conditions the bicarbonate will give up half its carbon dioxid and become the simple carbonate.

HOW THE BODY GETS RID OF THE POISONOUS GAS THAT IT MAKES

These two processes are going on ceaselessly in our blood and are necessary for our lives; but it seems that they go on much more easily and quickly in our blood than outside, partly because of the warmth of the body, and probably also because of some power the body has of making chemical changes within itself quick and easy, though they may be slow and difficult outside.

And now we can picture what happens when pure blood goes to nourish any part of the body. Dissolved in the fluid part of it is a quantity of sodium carbonate. Now, the part of the body to which it goes is living, which means burning, and has made a lot of carbon dioxid which it must get rid of. This passes into the blood and combines with the sodium carbonate which it finds there, so as to form sodium bicarbonate, and that is carried back in the veins, by which at last it reaches the lungs—it probably gets there even from the feet in about two minutes—and there the sodium bicarbonate is broken up again and loses the extra dose of carbon dioxid which it got from the body, and we breathe that out, and so are rid of it.

This, we see, leaves sodium carbonate again in the blood, ready to go to the tissues again and take up another dose of carbon dioxid just as it did before.

And so it goes round and round like the hemoglobin and the oxygen. The greatest difference is really that in the one case something which they want is being taken to the tissues, while in the other case something they must be rid of is being taken from them.

THE REAL MACHINERY THAT WORKS WHEN WE BREATHE

But now we are able to look at these two things as the two balanced halves of one process, and that process is breathing, the first necessity of all life.

Everything we call breathing—moving our chest and taking in air, and so on—is really only the beginning of one half of it—that is to say, getting the oxygen; and the end of the other half of it—that is to say, getting rid of the carbon dioxid. The real breathing is what the living cells of the body do themselves, aided by the ever moving blood, which brings oxygen and takes away the carbon dioxid.

We know that when a flame burns in a good draft, it burns quickly and brightly. Now what does the draft do? It simply blows oxygen to the fuel, and then blows away the carbon dioxid which is produced when it burns. If we come to think of it, that is exactly the same as what happens while the blood moves in our body; and just as a fire burns brightest in a good draft, so our bodies burn best and in the most healthy way when the blood moves quickly through them. Sometimes the blood moves too slowly and becomes almost stagnant in one part or another of the body. This simply means that that part cannot breathe, and so it falls ill. And if the blood is prevented altogether from going to any part of the body, in a very short time it will die. Perhaps we are beginning to learn how wonderful the blood is in our body.

NO MAN QUITE KNOWS THE BUSINESS OF THE SALT IN OUR BLOOD

There still remains the fluid part of the blood to study, and this is equally necessary for our lives. We have already learned one thing about it: that it contains various salts dissolved in it. They all are necessary; but if we had to call any one more important than the others, it would be the sodium carbonate or bicarbonate. This, however, is not the most abundant of the salts in blood.

Common salt, or sodium chlorid, is the most abundant salt in the blood and gives blood and tears their salt taste. We are

far from understanding yet why the sodium chlorid in the blood is really necessary. Certainly we know some useful things it does, but probably there is a great deal more that we do not know. It helps to keep certain parts of the blood and the body-fluid, for some of the things necessary to the blood and the body will turn stiff and solid if the salt is taken from them. Also, the common salt in the blood is of great importance in the digestion of food, for, as it passes through the walls of the stomach, certain cells that line the stomach act on this common salt and produce from it an acid called *hydrochloric acid*, which they pour into the stomach whenever we take any food. This is very important in digestion.

But the sodium chlorid of the blood is probably more important than we understand yet. As for the other salts, we scarcely know at all why they should be necessary, though they certainly are.

HOW THE BLOOD HELPS THE BODY TO GET RID OF USELESS MATTER

The rest of the fluid part of the blood is the most astonishing mixture of wonderful things in the whole world. Only lately have we begun to learn how wonderful it is.

Every speck of food that is to be of any use to us must be carried by the blood; and this alone means that it contains a large number of compounds of very different kinds—various kinds of fat, sugar, and especially the precious foodstuffs which we call proteins.

Then, again, all the substances which are produced by the life of the tissues and have to be got rid of are poured into, and contained in, the fluid part of the blood. We must not imagine that carbon dioxide is the only product of the life of the tissues, though it is the most important. There are many others, probably scores, all of which have to be got rid of by the various organs which, besides the lungs, exist to accomplish this purpose, especially the kidneys and the skin.

Nor is this all. The blood also contains various fluid substances which are poisonous to microbes. This is one of the reasons why we are ever healthy at all—why, though we frequently breathe microbes, though we take millions of them in our food, and though many of them would be injurious to us if they could, we lead what long ago would have been called a "charmed life." These pro-

TECTIVE substances are partly produced by the white cells of the blood, and are partly given to it by the tissues of the body. They exist in the blood of the lower animals as they do in our own.

THE GLANDS OF THE BODY, AND THE MARVELOUS THINGS THEY DO

Then the blood contains a large number of special compounds made by the body itself for its own use. Those parts of the body which produce special chemical substances are called glands. Many glands have tubes running from them into which they send what they produce; for instance, the glands that produce the saliva that comes into our mouths when we eat. But several other glands have no tubes at all. They exist in order to make contributions to the blood for the good of the whole body, and as the blood passes through them, it takes up these contributions and carries them where they will be useful. Then there are also, as we know, substances in the blood which simply act as messengers between one part of the body and another, and are carried about by it for that purpose.

Perhaps we shall begin to think, then, that a drop of blood is, on the whole, the most wonderful thing in the world; it would be very difficult to get anything so complicated in such a little space as a drop of blood.

THE GREAT DISCOVERY OF THE ACTION OF THE HEART

We must now learn about the heart, and the way in which it drives the blood. This great discovery was made by an Englishman, William Harvey, and it is fair to say that all real knowledge of the working of the body dates from that time. This is one of those great discoveries that opens the door to whole realms of nature.

Some discoveries are like this: they show the way to still further knowledge and give us the means of getting there. The discovery of the living cell, the discovery of gravitation, the discovery of the earth's motion round the sun, the discovery of the circulation of the blood—all these belong to this group of mighty keys to nature's plan; and when we go on to learn many new things about the body, and about life in general, we have to remember that, though we now see farther even than William Harvey, it is because we are, as it were, standing on his shoulders.

THE NEXT STORY OF OUR OWN LIFE IS ON PAGE 1209.

IN NOVA SCOTIA'S APPLE-BLOOM LAND OF EVANGELINE



"In the Acadian land, on the shores of the
Distant, secluded, still, the little village of

Basin of Minas,
Grand Pré

Lay in the fruitful valley. Vast meadows stretched to the eastward,
Giving the village its name."

Photo, A. L. Hardy, Kentville.



Longfellow's poem, Evangeline, tells how the British drove the French settlers
from their homes in 1755. Willows and well, with its well-sweep, are of their day.



Church and statue of Evangeline in the memorial park at Grand Pré. The willows
beyond mark the site of the Acadian village. Photo, MacAskill, Halifax.

The Book of CANADA

THE HISTORY OF CANADA

NOW we begin the story of Canada under English rule. We find that the English were wise enough to give the French inhabitants a great deal of freedom, and that Canada did not rebel when the thirteen southern colonies did. During the Revolution, and again during the War of 1812, there was much fighting in Canada, as the British used the country as a base from which to start expeditions. The province of Quebec was divided into Upper and Lower Canada, and some disturbances occurred. Finally, in 1840, the provinces were united, and were allowed to govern themselves for the most part.

CANADA AS AN ENGLISH COLONY

JAMES RUSSELL LOWELL once said that the British conquest of Canada made the United States possible. It removed from the thirteen colonies the fear of an enemy to the north which had so long threatened their homes and retarded commercial progress. It lessened the danger of Indian attacks which had been so much dreaded, and increased the feeling of independence among the English colonists and the feeling that they could do without British troops and protection. Some of the French officials seemed to see that Great Britain was to regret her success in this war.

When Canada was taken over, there were only a few hundred men of British blood in the whole colony. The great mass of the inhabitants were French who had for generations been enemies to England. Under the early British rule the change in the government of New France, or Quebec, as it was now called, was very slight. In 1763, after the Treaty of Paris was signed, a civil governor and a council were appointed. But until 1774 the military influence was supreme, and the power possessed by Lord Amherst, who succeeded General Wolfe, and by General Murray and Sir Guy Carleton, the first governors, was almost autocratic.

THE QUEBEC ACT AND THE NEW DIVISION OF THE COUNTRY

In 1774, however, the Quebec Act was passed, and this made a general

change of the government to meet the conditions which had arisen during

the decade of British rule.

By the terms of this act the province of Quebec was defined as extending southward to the Ohio, westward to the Mississippi, northward to the boundaries of the Hudson Bay territory, and eastward to the borders of Nova Scotia. All ordinances issued since 1763 were annulled. It was ordered that in all matters relating to property and civil rights the old laws and customs of French Canada should prevail, but in all criminal cases the English criminal law, which was less severe than the French, should be established. It was not thought wise to give the colonists a legislative assembly, so only a legislative council was authorized.

This council was to be appointed by the crown from persons living in the province. It was not to exceed twenty-three, nor to have less than seventeen, members. Its powers of legislation were limited. The right to levy taxes was withheld, with this exception, that the towns of the province might be allowed to tax themselves for purposes of local improvement. To cover the expense of governing the colony, the old French duties were abolished and in their place duties were placed upon spirits and molasses brought into the province. Entire freedom of worship was to be allowed. The Catholics were allowed to worship in their usual way, and their clergy were allowed to collect

the accustomed tithes from members of that church. The Catholics were also excused from taking certain oaths which were offensive to them when appointed to public office. Therefore it became possible for the Canadian seigniors to accept office in the legislative council, and a number were at once appointed. As a result the Canadian noblemen remained loyal to the British Government.

THE CANADIANS REMAIN LOYAL THROUGH THE AMERICAN REVOLUTION

As we have read in the Story of the United States, trouble began between Great Britain and the New England colonies soon after the conquest of Canada. The trouble came to a head about the time the Quebec Act was passed. There was not much interest aroused in Canada, however. At first there was some doubt about what the people of Quebec would do. However, the seigniors and the clergy, who were grateful for the Quebec Act, soon declared themselves in favor of England. Besides, after the act had been passed, the New England colonists had issued an "Address to the People of Great Britain" in which they complained bitterly of the act as a concession to the French Catholic population of Canada. The Canadians knew of this, and so they paid no heed when the Congress which was sitting at Philadelphia asked them to join in the Revolution. As soon as war broke out, the seigniors promptly offered to enroll as volunteers. The Catholic bishop published a letter in favor of British rule. Governor Carleton issued an order calling out the militia, and a small force was collected, though the habitants, as a body, refused to fight. At least they did not join the revolutionists.

THE INVASION OF CANADA DURING THE AMERICAN REVOLUTION

Soon after the battle of Bunker Hill, Congress determined to invade Canada, and two lines of invasion were adopted. Richard Montgomery with two thousand men descended Lake Champlain and captured Montreal, while Benedict Arnold marched through the forests of Maine and reached Quebec. Later the two commanders joined forces and on the last night of 1775 made a desperate assault upon Quebec. They forced their way into the town, but Montgomery was killed, Arnold was disabled, and the assault was finally repulsed. Arnold

kept the city under a strict blockade, and when in the early spring General John Thomas arrived with reinforcements, preparations for an active renewal of the siege were made. Early in May, however, the British fleet arrived with nine thousand soldiers on board, the city was relieved, and General Thomas was obliged to retreat.

CONGRESS MAKES ANOTHER ATTEMPT TO WIN THE FRENCH CANADIANS

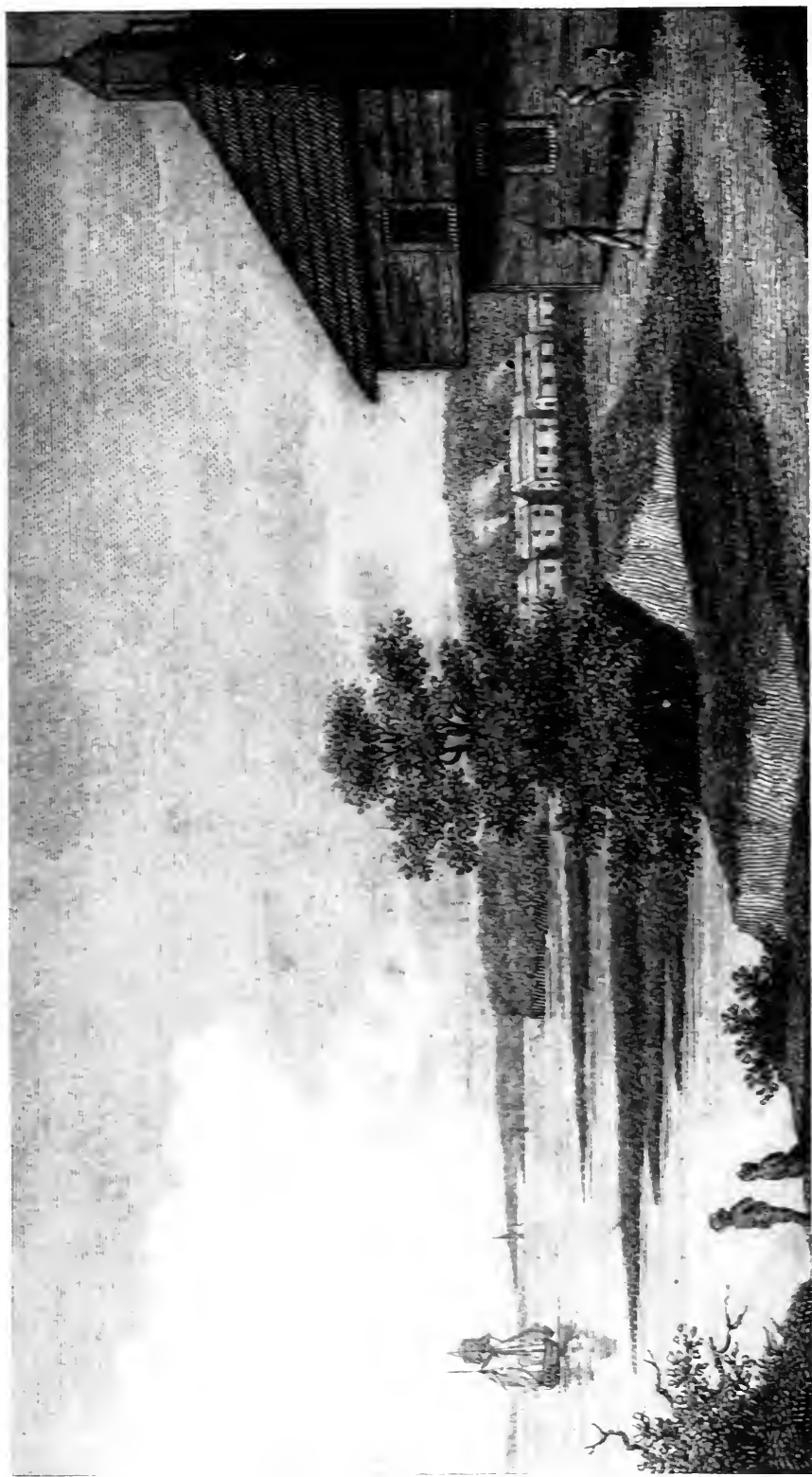
The progress of events in Canada aroused much interest in Congress, and there was still hope that the Canadians would join in the Revolution. General Washington was anxious that the province should join the revolting colonies. He was afraid that Canada would be made the base for an invasion of New York, and such an invasion, if successful, would divide the colonies. In the spring of 1776 three commissioners were appointed by Congress to go to Montreal to see if they could win the Canadians to their cause. For a time they remained in Montreal, and then for their own safety had to return home.

There was one more attempt to take Canada by force of arms. In a rash attempt to gain lost territory General William Thompson early in June advanced from Sorel against Three Rivers. After landing above the town the American army lost its way, got into a swamp, and in its plight was attacked by the British. General Thompson and about three hundred men were taken prisoners, and no further attack was made on Canada during the Revolution.

CANADA AT THE CLOSE OF THE AMERICAN REVOLUTION

We must remember that at this time Canada, as we now know it, did not exist. Few people knew of the forests and fertile valleys of British Columbia: the western plain was believed to be a frozen, howling waste; and Ontario was still covered with dense forests, the haunts of Indians and trappers. Quebec and Nova Scotia and the little province of Prince Edward Island were the only inhabited parts of the country, and even in these provinces, except on the seaboard and along the banks of the St. Lawrence, the population was sparse, and French in blood and language. But the Revolution brought a great change. During the Revolution and at its close many thousands of people who had not approved

YORK, NOW TORONTO, MORE THAN A HUNDRED YEARS AGO



This is a picture of the little town of York, the site of the present city of Toronto. York was burned by the Americans in the War of 1812, but was rebuilt, and the population increased so rapidly that it numbered 9,000 in 1834, when its name was changed to Toronto. It is now the second city in Canada in importance and population. The city has a fine harbor which is protected from the lake storms by an island at its entrance.

From an old print.

of the Revolution, and desired to live as British subjects, left the United States. They called themselves Loyalists, but the people of the United States generally called them Tories, and many were harshly treated. Many went northward and settled in the British provinces. They have been known since as the United Empire Loyalists. To be descended from a U. E. L. is counted an honor among Canadians.

Nova Scotia, which was under the rule of a governor and an assembly, had made rapid progress, and this province was the goal of many of the Loyalists, who settled for the most part along the river St. John. This large migration made a division of the province advisable, and in 1784 New Brunswick became a province with an assembly of its own.

When Prince Edward Island, which the French called the Island of St. John, was ceded to Great Britain, in 1763, its population consisted of about thirty Acadian families. In 1767 the island was given in separate grants to a number of friends of the English Government. Two years later it was declared a separate province, with a governor and an assembly. It was given its present name in 1799 in honor of the Duke of Kent, the father of Queen Victoria. Some Loyalists settled here.

Even before the American Revolution was over, thousands of Loyalists had traveled northward to make new homes in the Canadian forests beyond the Great Lakes. To these were added numbers of English soldiers who settled along the St. Lawrence and the northern shore of Lake Ontario; and to these first settlers liberal grants of land were made. All this country was then part of Quebec, but the colonists, who were nearly all English or of English descent, did not like being ruled by a mixture of French and English law. The fact was that they wanted the right to govern themselves. The few British in the province when the Quebec Act was passed had objected then, but they were so few that no attention was paid to them. Now there were several thousands of them, and dissatisfaction increased. It became so great that it was finally decided to divide Quebec into two provinces and give each a government of its own. At this time the governor was Lord Dorchester, who had been known as Sir Guy Carleton when he had been stationed in the province before.

QUEBEC DIVIDED INTO UPPER AND LOWER CANADA

The province was divided by the Constitutional Act passed by the British Parliament in 1791. The act divided Quebec into Upper and Lower Canada. The next year, 1792, a royal proclamation fixed the boundary line between the two provinces, which are now known as Ontario and Quebec.

For each of the new provinces a parliament was provided, which consisted of a legislative council appointed by the governor, and a legislative assembly elected by the people. The king was represented in each province by a lieutenant-governor, whose assent was necessary to all acts of the provincial legislature. There was a governor with authority over both provinces, but he spent most of his time in Lower Canada.

The legislative council of Lower Canada was to have not less than sixteen members, and the council of Upper Canada not less than seven. The legislative assembly of Lower Canada was to consist of not less than fifty members, and that of Upper Canada of not less than sixteen. Lower Canada kept its French laws and customs, while Upper Canada at once introduced the English law to which the people had been accustomed. This pleased the people in Upper Canada, but the British in Lower Canada were still dissatisfied.

TROUBLES IN THE PARLIAMENTS OF THE TWO PROVINCES

The first parliament of Lower Canada met at Quebec on December 17, 1792. On account of the differences of race, religion and language one would expect serious problems to arise. As a matter of fact, they did. Though for a few years all went smoothly, a struggle began between the English legislative council and the French assembly with the opening of the new century. Gradually the disputes became violent, and by 1812 an intense racial hatred existed between the French and the English.

The first assembly in Upper Canada was called together at Newark (now Niagara) on September 17, 1792. Its first act was to establish the English civil law. Later York (now Toronto) was chosen as the capital, and parliament met there for the first time in 1797.

During the early years of the province there was little trouble. The people were

all Loyalists whose chief interest was the building of homes in the wilderness. Later, however, radicals came from Scotland, liberals from England, and republicans from the United States. The new settlers were business men and were filled with democratic notions, and a conflict arose between the old Loyalists and the new reformers.

CANADA AND THE CAUSES LEADING TO THE WAR OF 1812

For a time, however, differences were forgotten in the War of 1812, between the United States and England. Canada had nothing to do with the causes of the war, but was again invaded by armies from the United States.

The reasons usually given for the War of 1812 are the famous Orders in Council. By these England declared a blockade of the whole European coast. She also claimed the "right of search," by which she said she had the right to board neutral ships in search of deserters from the navy. It was also claimed that the Canadian governor had sought to rouse the Indians in the West, a charge that Canadians have always steadily denied. Naturally the Orders in Council and the right of search caused much irritation, but the real causes of the war lay deeper. Many Americans had still a warm sympathy with France, their old ally in the struggle for independence. There was still the old hatred of Revolutionary days which created a desire to acquire British America. Few Americans realized that the Canadian Loyalists had deliberately chosen a country and a government of their own, and most of them had a strong belief that the conquest of Canada would be an easy matter. They were to find themselves badly mistaken.

DETROIT CAPTURED BY CANADIANS UNDER SIR ISAAC BROCK

Preparations were made for the invasion of Canada. General Hull was to cross the Detroit River. General Van Rensselaer to attack Niagara, and Commander-in-Chief Dearborn to march against Montreal. At this time there were fewer than five thousand British regulars in all Canada. The Canadians put forth every effort to resist the invading army. Sir Isaac Brock, who was in command of the force of Upper Canada, marched with the Indians under Tecumseh against Hull, who was stationed at Detroit. Before an attack could be made

Hull and his entire army surrendered. This was a great blow to American pride. Before the end of the year Sir Isaac Brock was killed at Queenston, and United States troops burned York, the capital.

THE AMERICANS WIN AN IMPORTANT NAVAL VICTORY

The first half of the year 1813 was very favorable to the Canadian army, but the tide turned in September when Perry won a naval victory over the English fleet under Captain Barclay. This victory on Lake Erie enabled Harrison to enter Canada, and he defeated Colonel Procter and Tecumseh at Moraviantown, where the Indian chief was killed. In the same year the Americans were defeated at Chateaugay and Chrysler's Farm.

The next summer the Americans attempted to invade Canada by way of Niagara River. Jacob Brown and Winfield Scott crossed the river and fought the battles of Chippewa and Lundy's Lane, but they were finally forced to retreat to American soil. At the same time the British were defeated at Plattsburg. The war was very unpopular in many parts of the United States. Both sides were weary of fighting, and on Christmas eve, 1814, a treaty was signed at Ghent which left the boundaries as they had been before.

THE REBELLION OF 1837 AND WHAT LED TO IT

The war was thus happily ended, but the young country had more troubles to go through before it became a united nation. As we have seen, there were two councils in each province as well as the legislative assembly, and in addition there were a number of government officials. Naturally the councilors were chosen by the governors from among the more prominent men. Gradually these men got most of the power into their own hands and were able to persuade the governor that what they wished was the best policy that he could follow. In Upper Canada this little group of men was called the "Family Compact." In Lower Canada the same kind of group was called the "Chateau Clique." You must remember that, though the people of Canada had a voice in the assembly, they could not control the governor and the council. They had representative government, but not responsible government.

The assemblies thought that the coun-

cils should not be permitted to control and govern the province completely, and strong opposition soon arose.

REBELLIONS BREAK OUT IN BOTH CANADAS

In Lower Canada the leader of this opposition was Louis Papineau. He de-



William Lyon Mackenzie.

manded that the permanent officials of the crown should be free from politics. A bitter struggle followed, and Lord Dalhousie, the governor-general, was recalled. Petitions of grievances were sent to England. Parliament appointed a committee to investigate, but its report in 1828 did not please Papineau and his party. Efforts at conciliation failed, and in the assembly Papineau boldly denounced monarchy and British rule, and commenced to plan for a French republic. But the Catholic bishop took a stand against the rebel, so the rising was a small affair.

Meanwhile a crisis was reached in Upper Canada. There the leader of the opposition was William Lyon Mackenzie, a newspaper editor, who for years was very popular with the people. He was expelled from the assembly several times, but was as often re-elected. In 1834 he had control of the assembly, and a petition of grievances was sent to Eng-

land. Two years later he was defeated, chiefly because he was opposed by the moderate reformers under Dr. Egerton Ryerson. In his disappointment Mackenzie deliberately planned rebellion.

In December, 1837, Mackenzie collected five hundred men at Montgomery's Tavern, a little north of Toronto. These followers had a scant supply of arms and were not men who counted for much in the eyes of their fellow-countrymen. But of such material a mob is often made. The news of the gathering at the Tavern roused the citizens of Toronto. Recruits came pouring into the city from all over the province to fight the rebels.

In Lower Canada the rebellion broke out in October and was quickly suppressed. Papineau fled from the country. The rising in Upper Canada was still more feeble. Mackenzie, too, was forced to flee, but succeeded in reaching the American frontier. There he violated the rules of neutrality by inciting bands of ruffians to invade Canada. The Eng-



Louis Joseph Papineau.

lish Government realized that reforms must be made. Lord Durham was sent out as governor-general, with full power to restore peace. He made a report which served as the basis of the Act of Union (1840) and soon a great degree of self-government was granted to the province.

THE NEXT STORY OF CANADA IS ON PAGE 1483.

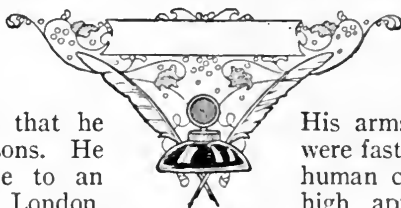
DEAN SWIFT'S GREAT SATIRE

A FEW years after Robinson Crusoe was published, one of the greatest satirical stories in our language appeared. This was *Travels into Several Remote Nations of the World*, the author of which called himself "Lemuel Gulliver." The first part appeared in 1726. It was written just like a book of real travel, but its purpose was to satirize the England of that time, to laugh at its follies. The story is extraordinary, and people liked it because it was so unusual. It has been a favorite with young folk for many generations, as the adventures it describes are so quaintly impossible that they are interesting quite apart from their inner meaning. The author was the Rev. Jonathan Swift, Dean of St. Patrick's, Dublin. Lilliput is meant for England. The war with Blefuscu about the eggs is meant to ridicule the stupid reasons nations had for making war.

GULLIVER'S TRAVELS

LEMUEL GULLIVER tells us that his father had a small estate in Nottinghamshire, and that he was the third of five sons. He was bound apprentice to an eminent surgeon in London. His father now and then sending him small sums of money, he laid them out in learning navigation. He believed that some day he would travel, and this knowledge would be useful to him. He did become surgeon successively in two ships, and made several voyages to the East and West Indies. His hours of leisure on these voyages were spent in reading the best authors. When he went ashore he observed the manners of the people and learned their language.

Gulliver afterward accepted an offer from Captain Prichard, master of the *Antelope*, who was making a voyage to the South Sea, and set sail from Bristol, May 4, 1699. They were driven by a storm to the northwest of Van Diemen's Land, where they were tossed on a rock. Six of the crew, of whom Gulliver was one, launched a lifeboat and got into it, but in about half an hour it was upset. What became of his companions he did not know, but he swam as fortune directed him. When he was almost worn out, he found himself within his depth, and so, throwing himself on the ground in



weariness, Gulliver fell asleep at once. When he waked he was unable to move.

His arms, legs, body and hair were fastened to the ground. A human creature not six inches high appeared on his chest.

More were running over his body when he roared and frightened them off. An attempt to free his left arm brought a shower of tiny arrows which pricked like needles. He decided to remain quiet, and no more arrows were discharged. The tiny people built a platform one and a half feet high near Gulliver's head. From this a person of authority made an address. By signs Gulliver showed his hunger. He was given whole joints of meat which were about the size of birds' wings. The loaves of bread, each about the size of a rifle bullet, Gulliver ate three at a time. When his hunger was satisfied, he was given two barrels of wine, each containing 108 tiny gallons. He astounded the Lilliputians (as he discovered the name of the people to be) by drinking a barrel at a swallow.

After this Gulliver went to sleep and slept for about eight hours. The Lilliputians dabbed his face and hands with an ointment which removed all smart of their arrows.

By the emperor's orders the physicians had mingled a sleeping potion in the wine given to Gulliver. While

drugged he was conveyed to the Lilliputian capital on an engine made by a small army of engineers and carpenters, and drawn by fifteen hundred of the emperor's largest horses. There was outside the capital an ancient temple, the largest in the kingdom. The great gate was about four feet high and two feet wide, and through this he managed to creep. To the portal of this temple he was for a time chained by his left leg.

Some hundred thousand of the inhabitants came out to view him, and his guards numbered ten thousand. He continued to lie on the ground of the temple for about a fortnight. Then the emperor caused a bed to be made for him, six hundred beds of the common size being used for this purpose. An imperial order was issued, obliging all the villages nine hundred yards round the city to provide the prisoner with food and drink. Payment for this was to be made from the imperial treasury. The allowance stipulated was sufficient for the support of 1,728 Lilliputians.

An establishment of six hundred domestics was also arranged for him. Further, three hundred tailors were appointed to make him a suit of clothes

after the fashion of the country. The land appeared like a continuous garden, and the inclosed fields, which were generally forty feet square, resembled so many beds of flowers.

Proclamations were issued directing all who had beheld the Man-Mountain, as he was called in the language of the country, to return home and not to come within fifty yards of his house without license from the court. This was to prevent anyone's being hurt.

GULLIVER AT THE ROYAL PALACE OF LILLIPUT

One day the emperor desired Gulliver to stand up like the Colossus, with his legs apart. Between his legs marched the Lilliputian army. The troops so engaged numbered three thousand foot and a thousand horse.

At last, upon certain conditions, Gulliver was given his liberty, and was allowed to see the capital. The people had notice by proclamation of his design to visit the town. When he had finished his inspection, the emperor of Lilliput sent Gulliver a special invitation to visit the royal palace.

What follows is told in Gulliver's own words.

GULLIVER IN THE LAND OF LILLIPUT

THE emperor had a great desire that I should see the magnificence of his palace; but this I was not able to do till three days after, which I spent in cutting down with my knife some of the largest trees in the royal park, about a hundred yards distance from the city. Of these trees I made two stools, each about three feet high, and strong enough to bear my weight. The people having received notice a second time, I went again through the city to the palace with my two stools in my hands. When I came to the side of the outer court, I stood upon one stool, and took the other in my hand; this I lifted over the roof, and gently set it down on the space between the first and second court, which was eight feet wide. I then stepped over the building very conveniently from one stool to the other, and drew up the first after me with a hooked stick. By this contrivance I got into the inmost court; and, lying down upon my side, I applied my face to the windows of the middle stories, which were left open on purpose, and discovered the most splendid apartments that can be imagined.

There I saw the empress and the young princes, in their several lodgings, with their chief attendants about them. Her imperial majesty was pleased to smile very graciously upon me, and gave me out of the window her hand to kiss. I did this as gallantly as possible.

One morning, about a fortnight after I had obtained my liberty, Reldresal, principal secretary for private affairs, came to my house attended only by one servant. He ordered his coach to wait at a distance, and desired I would give him an hour's audience; which I readily consented to, on account of his quality and personal merits, as well as of the many good offices he had done me during my solicitations at court. I offered to lie down, that he might the more conveniently reach my ear; but he chose rather to let me hold him in my hand during our conversation. He began with compliments on my liberty; said "he might pretend to some merit in it;" but however added, "that if it had not been for the present situation of things at court, perhaps I might not have obtained it so soon."

GULLIVER BOUND AND GULLIVER FREE



Gulliver had been driven ashore from a wreck on the coast of a strange land, which turned out to be Lilliput. As he lay asleep the Lilliputians, none of whom was bigger than one of Gulliver's fingers, secured him to the earth with numerous ropes and pegs. When he awoke and began to wrench himself free, he shook many of the little people off him like flies. They had to attack him with whole regiments of archers to make him lie quiet before they conveyed him, with infinite labor, to the capital of Lilliput.



It was no easy matter for Gulliver to accept the king's invitation to inspect the palace, as he could not step over the houses and walls without knocking some of them down. But at length, by making a stool out of some of the trees he found growing in the park, he stepped across without damaging the buildings. In order to look into the rooms in the upper stories he had to lie down in the great square of the palace. The queen looked out of the window, and smiling very graciously upon him, gave him her hand to kiss.

For," said he, "as flourishing a condition as we may appear to be in to foreigners, we labor under two mighty evils; a violent faction at home, and the danger of an invasion, by a most potent enemy, from abroad. As to the first, you are to understand, that for above seventy moons past there have been two struggling parties in this empire, under the names of *Tramecksan* and *Slamecksan*, from the high and low heels of their shoes, by which they distinguish themselves. It is alleged, indeed, that the high heels are most agreeable to our ancient constitution; but, however this be, his majesty has determined to make use only of low heels in the administration of the government, and all offices in the gift of the crown, as you cannot but observe: and particularly that his majesty's imperial heels are lower at least by a *drurr* than any of his court (*drurr* is a measure about the fourteenth part of an inch). The animosities between these two parties run so high, that they will neither eat, nor drink, nor talk with each other. How, in the midst of these intestine disquiets, we are threatened with an invasion from the island of *Blefuscu*, which is the other great empire of the universe, almost as large and powerful as this of his majesty. These two mighty powers have, as I was going to tell you, been engaged in a most obstinate war for six and thirty moons past. It began upon the following occasion. It is allowed on all hands, that the primitive way of breaking eggs before we eat them was upon the larger end; but his present majesty's grandfather, while he was a boy, going to eat an egg, and breaking it according to the ancient practice, happened to cut one of his fingers; whereupon the emperor his father published an edict, commanding all his subjects, upon great penalties, to break the smaller end of their eggs. The people so highly resented this law, that our histories tell us there have been six rebellions raised on that account; wherein one emperor lost his life, and another his crown. These civil commotions were constantly fomented by the monarchs of *Blefuscu*; and when they were quelled, the exiles always fled for refuge to that empire. It is computed that eleven thousand persons have, at several times, suffered death rather than submit to break their eggs at the smaller end. Many hundred large volumes have

been published upon this controversy: but the books of the *Big-endians* have been long forbidden, and the whole party rendered incapable by law of holding employments. The enemy have now equipped a numerous fleet, and are just preparing to make a descent upon us; and his imperial majesty, placing great confidence in your valor and strength, has commanded me to lay this account of his affairs before you."

I desired the secretary to present my humble duty to the emperor; and to let him know that I was ready, with the hazard of my life, to defend his person and state against all invaders.

The empire of *Blefuscu* is an island situated to the northeast of *Lilliput*, from which it is parted only by a channel of eight hundred yards wide. I had not yet seen it, and upon this notice of an intended invasion, I avoided appearing on that side of the coast, for fear of being discovered by some of the enemy's ships, who had received no intelligence of me; all intercourse between the empires having been strictly forbidden during the war, upon pain of death, and an embargo laid by our emperor upon all vessels whatsoever. I communicated to his majesty a project I had formed, of seizing the enemy's whole fleet; which, as our scouts assured us, lay at anchor in the harbor, ready to sail with the first fair wind. I consulted the most experienced seamen upon the depth of the channel, which they had often plumbed; who told me that in the middle at high water it was seventy *glumgluffs* deep, which is about six feet of European measure; and the rest of it fifty *glumgluffs* at most. I walked towards the northeast coast, over against *Blefuscu*; where, lying down behind a hillock, I took out my small perspective glass, and viewed the enemy's fleet at anchor, consisting of about fifty men-of-war, and a great number of transports: I then came back to my house, and gave orders (for which I had a warrant) for a great quantity of the strongest cables and bars of iron. The cable was about as thick as packthread, and the bars of the length and size of a knitting-needle. I trebled the cable to make it stronger, and for the same reason I twisted three of the iron bars together, bending the extremities into a hook. Having thus fixed fifty hooks to as many cables, I went back to the northeast

coast, and putting off my coat, shoes, and stockings, walked into the sea, in my leathern jerkin, about half an hour before high-water. I waded through with what haste I could, and swam in the middle about thirty yards, till I felt ground. I arrived at the fleet in less than half an hour. The enemy were so frightened when they saw me, that they leaped out of their ships, and swam to shore, where there could not be fewer than thirty thousand souls. I then took my tackling, and fastening a hook to the hole at the prow of each, I tied all the cords together at the end. While I was thus employed, the enemy discharged several thousand arrows, many of which stuck in my hands and face; and, besides the excessive smart, gave me much disturbance in my work. My greatest apprehension was for my eyes, which I should have infallibly lost, if I had not suddenly thought of an expedient. I kept, among other little necessities, a pair of spectacles in a private pocket; these I took out and fastened as strongly as I could upon my nose, and thus armed, went on boldly with my work, in spite of the enemy's arrows, many of which struck against the glasses of my spectacles, but without any effect. I had now fastened all the hooks, and taking the knot in my hand, began to pull; but not a ship would stir, for they were all too fast held by their anchors, so that the boldest part of my enterprise remained. I therefore let go the cord, and leaving the hooks fixed to the ships, I resolutely cut with my knife the cables that fastened the anchors, receiving about two hundred shots in my face and hands; then I took up the knotted end of the cables, to which my hooks were tied, and with great ease drew fifty of the enemy's largest men-of-war after me.

The Blefuscudians, who had not the least notion of what I intended, were at first confounded with astonishment. They had seen me cut the cables, and thought my design was only to let the ships run adrift, or fall foul of each other; but when they perceived the whole fleet moving in order, and saw me pulling at the end, they set up such a scream of grief and despair as it is almost impossible to describe. When I had got out of danger, I stopped awhile to pick out the arrows that stuck in my face; and rubbed on some of the same ointment that was given

me on my arrival, as I have formerly mentioned. I then took off my spectacles, and waiting about an hour, till the tide was a little fallen, I waded through the middle with my cargo, and arrived safe at the port of Lilliput.

The emperor and his whole court stood on the shore, expecting the issue of this great adventure. They saw the ships move forward in a large half-moon, but could not discern me, who was up to my breast in water. When I advanced to the middle of the channel, they were yet more in pain, because I was under water to my neck. The emperor concluded me to be drowned, and that the enemy's fleet was approaching in a hostile manner: but he was soon eased of his fears; for the channel growing shallower every step I made, I came in a short time within hearing, and holding up the end of the cable by which the fleet was fastened, I cried in a loud voice, "Long live the most puissant king of Lilliput!" The prince received me at my landing with all possible encomiums.

His majesty desired that I should take some other opportunity of bringing all the rest of his enemy's ships into his ports. And so unmeasurable is the ambition of princes, that he seemed to think of nothing less than reducing the whole empire of Blefuscu into a province, and governing it by a viceroy; of destroying the Big-endian exiles, and compelling that people to break the smaller end of their eggs, by which he would remain the sole monarch of the whole world. But I endeavored to divert him from this design by many arguments drawn from the topics of policy as well as justice; and I plainly protested, "that I would never be an instrument of bringing a free and brave people into slavery."

The foregoing has been given in Gulliver's words. We shall tell in condensed form more of his story.

But because Gulliver protested against the Emperor's revengeful design for reducing the whole of the rival empire into a province and destroying the Big-endian exiles, he fell into disfavor.

Being informed of a design to accuse him of high treason, he made his escape to Blefuscu. Whence, by a lucky accident, he secured the means of reaching his own country again, and returned to England on April 13, 1702.

Like Robinson Crusoe, Gulliver had a passion for travel. On the twentieth of June following his return from Lilliput, he sailed for Surat, in the *Adventure*. About a year later this vessel was driven in an eastward direction, past the Molucca Islands. The ship being in need of water, the captain sent a party ashore in the long-boat, Gulliver being of the number. When they came to land, Gulliver wandered about a mile away from the sea.

Returning to the creek, he saw the men already in the boat, and rowing for life to the ship. He was about to holloa after them, when he observed a huge creature walking after them in the sea. But the men, having the start, escaped. Gulliver ran inland and up a steep hill which gave him a view of the surrounding country.

He found it fully cultivated. But what first surprised him was the length of the grass, which in those grounds that seemed to be kept for hay was about twenty feet high. He came upon a high road, so he imagined, though it served to the inhabitants only as a footpath through a field

of barley! Here he walked for some time, but could see little on either side, it being now near harvest, and the corn rising at least forty feet. In a field he saw several giants with reaping-hooks.

Gulliver lamented his folly and willfulness in attempting a second voyage against the advice of all his friends and relatives. As he lay hidden in a ridge for terror, one of the reapers approached so near as to make him fear that he should be squashed to death under foot or cut in two with the reaping-hook. He screamed as loudly as he could. The reaper picked him up and examined him in surprise. Then he took the tiny stranger to the farmer, his master.

Gulliver was received well in the farmer's family, and made a pet of by the farmer's daughter. The farmer was advised to exhibit him for money. Finally, he was sold to the queen of the land, and had much conversation with the king, when he had mastered the language of the country.

Here Gulliver continues the story in his own words.

GULLIVER IN THE LAND OF BROBDINGNAG

HE desired the queen to order that particular care should be taken of me; and was of opinion that Glumdalclitch should still continue in her office of tending me, because he observed we had a great affection for each other. A convenient apartment was provided for her at court; she had a sort of governess appointed to take care of her education, a maid to dress her, and two other servants for menial offices; but the care of me was wholly appropriated to herself. The queen commanded her own cabinet-maker to contrive a box, that might serve me for a bed-chamber, after the model that Glumdalclitch and I should agree upon. This man was a most ingenious artist, and according to my direction, in three weeks finished for me a wooden chamber of sixteen feet square, and twelve high, with sash-windows, a door, and two closets, like a London bed-chamber. The board that made the ceiling, was to be lifted up and down by two hinges to put in a bed ready furnished by her majesty's upholsterer, which Glumdalclitch took out every day to air, made it with her own hands, and letting it down at night, locked up the roof over me. A nice workman, who was famous for little

curiosities, undertook to make me two chairs, with backs and frames, of a substance not unlike ivory, and two tables, with a cabinet to put my things in. The room was quilted on all sides, as well as the floor and the ceiling, to prevent any accident from the carelessness of those who carried me, and to break the force of a jolt, when I went in a coach. I desired a lock for my door, to prevent rats and mice from coming in. The smith, after several attempts, made the smallest that ever was seen among them, for I have known a larger at the gate of a gentleman's house in England.

The queen became so fond of my company, that she could not dine without me. I had a table placed upon the same at which her majesty ate, just at her elbow, and a chair to sit on. Glumdalclitch stood on a stool on the floor near my table, to assist and take care of me. I had an entire set of silver dishes and plates, and other necessities, which, in proportion to those of the queen, were not much bigger than what I have seen in a London toy-shop, for the furniture of a baby-house: these my little nurse kept in her pocket, in a silver box, and gave me at meals as I wanted them, always clean-

ing them herself. No person dined with the queen but the two princesses royal, the eldest sixteen years old, and the younger at that time thirteen and a month. Her majesty used to put a bit of meat upon one of my dishes, out of which I carved for myself, and her diversion was to see me eat in miniature; for the queen (who had indeed but a weak stomach) took up, at one mouthful, as much as a dozen English farmers could eat at a meal, which to me was for some time a very nauseous sight. She would crunch the wing of a lark, bones and all, between her teeth, although it were nine times as large as that of a full-grown turkey; and put a bit of bread in her mouth as big as two twelvepenny loaves. She drank out of a golden cup, above a hogshead at a draught. Her knives were twice as long as a scythe, set straight upon the handle. The spoons, forks, and other instruments were all in the same proportion. I remember when Glumdalclitch carried me, out of curiosity, to see some of the tables at court, where ten or a dozen of those enormous knives and forks were lifted up together, I thought I had never till then beheld so terrible a sight.

It is the custom, that every Wednesday the king and queen, with the royal issue of both sexes, dine together in the apartment of his majesty, to whom I was now become a great favorite; and at these times, my little chair and table were placed at his left hand, before one of the salt-cellars. This prince took a pleasure in conversing with me, inquiring into the manners, religion, laws, government, and learning of Europe; wherein I gave him the best account I was able. His apprehension was so clear, and his judgment so exact, that he made very wise reflections and observations upon all I said. But after I had been talking copiously of my own beloved country, turning to his first minister, who waited behind him with a white staff, near as tall as the mainmast of the Royal Sovereign, he observed, "how contemptible a thing was human grandeur, which could be mimicked by such diminutive insects as I, and yet," said he, "I dare engage these creatures have their titles and distinctions of honor; they contrive little nests and burrows, that they call houses and cities; they make a figure and dress in equipage; they love, they fight, they dispute, they

cheat, they betray." And thus he continued, while my color came and went several times, with indignation, to hear our noble country, the mistress of arts and arms, the scourge of France, the arbitress of Europe, the seat of virtue, piety, honor, and truth, the pride and envy of the world, so contemptuously treated.

But as I was not in a condition to resent injuries; upon mature thoughts I began to doubt whether I was injured or no. For after having been accustomed several months to the sight and converse of this people, and observed every object upon which I cast my eyes to be of proportionable magnitude, the horror I had at first conceived from their bulk and aspect was so far worn off, that if I had then beheld a company of English lords and ladies in their finery and birth-day clothes, acting their several parts in the most courtly manner of strutting, and bowing, and prating, to say the truth, I should have been strongly tempted to laugh as much at them as the king and his grantees did at me. Neither, indeed, could I forbear smiling at myself, when the queen used to place me upon her hand towards a looking-glass, by which both our persons appeared before me in full view together; there could be nothing more ridiculous than the comparison; so that I really began to imagine myself dwindled many degrees below my usual size.

Nothing angered and mortified me so much as the queen's dwarf; who being of the lowest stature that was ever in that country (for he was not full thirty feet high), became so insolent at seeing a creature so much beneath him, that he would affect to swagger and look big as he passed by me in the queen's ante-chamber, while I was standing on some table talking with the lords or ladies of the court, and he seldom failed of a smart word or two upon my littleness; against which I could only revenge myself by calling him brother, challenging him to wrestle, and such repartees as are usually in the mouths of court pages. One day at dinner, this malicious little cub was so nettled with something I had said to him, that raising himself upon the frame of her majesty's chair, he took me up by the middle, as I was sitting down not thinking any harm, and let me drop into a large silver bowl of cream, and then ran away as fast as he could. I fell over

head and ears, and, if I had not been a good swimmer, it might have gone very hard with me; for Glumdalclitch in that instant happened to be at the other end of the room, and the queen was in such a fright, that she wanted presence of mind to assist me. But my little nurse ran to my relief, and took me out, after I had swallowed above a quart of cream. I was put to bed: however, I received no other damage than the loss of a suit of clothes, which were utterly spoiled. The dwarf was soundly whipped, and, as a further punishment, forced to drink up the bowl of cream into which he had thrown me; neither was he ever restored to favor; for soon after the queen bestowed him on a lady of high quality, so that I saw him no more, to my very great satisfaction: for I could not tell to what extremity such a malicious urchin might have carried his resentment.

I was frequently rallied by the queen on account of my fearfulness; and she used to ask me whether the people of my country were as great cowards as myself? The occasion was this: the kingdom is much pestered with flies in summer; and these odious insects, each of them as big as a Dunstable lark, hardly gave me any rest while I sat at dinner, with their continual humming and buzzing about my ears. I had much ado to defend myself against these detestable animals, and could not forbear starting when they came on my face. It was the common practice of the dwarf, to catch a number of these insects in his hand, as school-boys do among us, and let them out suddenly under my nose, on purpose to frighten me, and divert the queen. My remedy was to cut them in pieces with my knife, as they flew in the air, wherein my dexterity was much admired.

I remember, one morning, when Glumdalclitch had set me in a box upon a window, as she usually did in fair days, to give me air (for I durst not venture to let the box be hung on a nail out of the window, as we do with cages in England), after I had lifted up one of my sashes, and sat down at my table to eat a piece of sweet cake for my breakfast, above twenty wasps, allured by the smell, came flying into the room humming louder than the drones of as many bagpipes. Some of them seized my cake, and carried it piecemeal away; others flew about my

head and face, confounding me with the noise, and putting me in the utmost terror of their stings. However, I had the courage to rise and draw my hanger, and attack them in the air. I dispatched four of them, but the rest got away, and I presently shut my window. These insects were as large as partridges; I took out their stings, found them an inch and a half long, and as sharp as needles. I carefully preserved them all; and having since shown them, with some other curiosities, in several parts of Europe, upon my return to England I gave three of them to Gresham College, and kept the fourth for myself.

I now intend to give the reader a short description of this country, as far as I travelled in it, which was not above two thousand miles round Lorbrulgrud, the metropolis.

The country is well inhabited, for it contains fifty-one cities, nearly a hundred walled towns, and a great number of villages. To satisfy the curious reader, it may be sufficient to describe Lorbrulgrud. This city stands upon almost two equal parts, on each side the river that passes through. It contains above eighty thousand houses, and about six hundred thousand inhabitants. It is in length three *glomglungs* (which make about fifty-four English miles), and two and a half in breadth; as I measured it myself in the royal map made by the king's order, which was laid on the ground on purpose for me, and extended a hundred feet: I paced the diameter and circumference several times barefoot, and computing by the scale, measured it pretty exactly.

The king's palace is no regular edifice, but a heap of building, about seven miles round: the chief rooms are generally two hundred and forty feet high, and broad and long in proportion. A coach was allowed to Glumdalclitch and me, wherein her governess frequently took her out to see the town, or go among the shops; and I was always of the party, carried in my box; although the girl, at my own desire, would often take me out, and hold me in her hand, that I might more conveniently view the houses and the people, as we passed along the streets. I reckoned our coach to be about a square of Westminster-hall, but not altogether so high: however, I cannot be very exact.

Besides the large box in which I was

THE ARMY OF LILLIPUT MARCHES PAST



One of the most curious incidents in Gulliver's sojourn among the Lilliputians occurred when the Emperor marched the army of 3,000 foot and 1,000 horse between the gigantic legs of the Man-Mountain.

usually carried, the queen ordered a smaller one to be made for me, of about twelve feet square, and ten high, for the convenience of travelling; because the other was somewhat too large for Glumdalclitch's lap, and cumbersome in the coach; it was made by the same artist, whom I directed in the whole contrivance. This travelling closet was an exact square, with a window in the middle of three of the squares, and each window was latticed with iron wire on the outside, to prevent accidents in long journeys. On the fourth side, which had no window, two strong staples were fixed, through which the person that carried me, when I had a mind to be on horseback, put a leathern belt, and buckled it about his waist. This was always the office of some grave trusty servant, in whom I could confide, whether I attended the king or queen in their progresses, or was disposed to see the gardens, or to pay a visit to some great lady or minister of state in the court, when Glumdalclitch happened to be indisposed; for I soon began to be known and esteemed among the greatest officers, I suppose more upon account of their majesties' favor, than any merit of my own. In journeys, when I was weary of the coach, a servant on horseback would buckle on my box, and place it upon a cushion before him; and there I had a full prospect of the country on three sides, from my three windows. I had, in this closet, a field-bed and a hammock hung from the ceiling, two chairs and a table, neatly screwed to the floor, to prevent being tossed about by the agitation of the horse or the coach. And having been long used to sea-voyages, those motions, although sometimes very violent, did not much discompose me.

I was very desirous to see the chief temple, and particularly the tower belonging to it, which is reckoned the highest in the kingdom. Accordingly, one day my nurse carried me thither, but I may truly say that I came back disappointed; for the height is not above three thousand feet, reckoning from the ground to the highest pinnacle top: which, allowing for the difference between the size of those people and us in Europe, is no great matter for admiration, nor at all equal in proportion (if I rightly remember), to Salisbury steeple. But, not to detract from a nation to which, during my life, I shall acknowledge myself ex-

tremely obliged, it must be allowed, that, whatever this famous tower wants in height, is amply made up in beauty and strength; for the walls are near a hundred feet thick, built of hewn stone, whereof each is about forty feet square, and adorned on all sides with statues of gods and emperors, cut in marble, larger than life, placed in their several niches. I measured a little finger which had fallen down from one of these statues, and lay unperceived among some rubbish, and found it exactly four feet and an inch in length. Glumdalclitch wrapped it up in her handkerchief, and carried it home in her pocket, to keep among other trinkets; of which the girl was very fond, as children at her age usually are.

One day, Glumdalclitch left me on a smooth grass-plot to divert myself, while she walked at some distance with her governess. In the meantime, there suddenly fell such a violent shower of hail, that I was immediately, by the force of it, struck to the ground; and when I was down, the hailstones gave me such cruel bangs all over the body, as if I had been pelted with tennis-balls; however, I made a shift to creep on all fours, and shelter myself, by lying flat on my face, on the leeside of a border of lemon-thyme; but so bruised from head to foot, that I could not go abroad for ten days. Neither is this at all to be wondered at, because as nature in that country observes the same proportion through all her operations, a hailstone is nearly eighteen hundred times as large as one in Europe; which I can assert upon experience, having been so curious as to weigh and measure them.

We must close the quotation to tell briefly what else happened to Gulliver.

After going through many adventures, he was in his box one day when it was caught up by a great bird, and carried out to sea, where it fell in the water. The box was seen by the captain of a ship. Thus it was that Gulliver was released and returned to England in 1706.

Gulliver in his later travels went to Laputa, a flying island inhabited by philosophers and astronomers. His last adventure brought him to the country of the Houyhnhnms, in which horses were the representatives of civilization, and men, under the name of Yahoos, were degraded beings of the lowest type.

THE NEXT STORY OF FAMOUS BOOKS IS ON PAGE 1421.



A Raphael fresco filling a lunette in the Vatican.

RAPHAEL AND HIS TIME

WHILE Michelangelo was working at his immortal frescoes and statuary, and attracting the attention of beauty-loving people to Rome, two other artists, also born in Florence, were continuing the traditions of the famous town. They were men who would have been unequalled leaders in a period less rich in art; had Leonardo da Vinci and Michelangelo never been born, Fra Bartolommeo and Andrea del Sarto would themselves, in the same generation, have made the name of Florence memorable.

During the two centuries in which Tuscan art was developing, painting as painting—that is to say, the technique of the art apart from the subject painted—had passed through a curious change. Let us review quickly this change, to which we have already given attention in the preceding chapters. We have seen Duccio seeking after more living forms, but not quite able to embody the sense of life in his painted shapes; then Giotto, with his more vigorous work presented in clear, water-color tones. Then came Fra Angelico and Botticelli, whose faults of technique we forgive for the sake of their spiritual and temperamental charms. After them Cosimo showed an advance in strength and sweetness, and Masaccio made men stop to think

because he painted, with definite strokes, vigorous persons and definite situations. And Leonardo, with a technique both strong and pliant, was the first artist to introduce into painting what is called *chiaroscuro*—light and shade in color. The work of Fra Bartolommeo and Andrea del Sarto followed as a natural outcome of these changing styles.

Fra Bartolommeo, who lived from 1475 to 1517, stands out both as a wonderful colorist and as a remarkable master of composition. He built up masses of figures as an architect throws out buttresses and towers from a central body of stone. This faculty is shown in almost all the artist's work. There is the fine painting called *The Virgin Appearing to St. Bernard*, now in the Florence Academy, where the figures are piled up on either hand from an almost empty central space. In the picture called *Madonna della Misericordia*, in the gallery at Lucca, groups of people are arranged in a truly monumental fashion.

The painter-monk produced many works in his short lifetime—altarpieces, frescoes, a great many smaller pictures, Holy Families and Madonnas. Raphael's attention was caught by a fresco of Bartolommeo's, painted in the hospital of Santa Maria Nuova in

Florence. Raphael was impressed by both the color and the composition in the monk's work, and sought to learn some of his secrets of technique.

Had Bartolommeo had even a small degree of the skill in delineation of character and individual beauty which Leonardo possessed, he would have been counted among the great masters. His genius lay in the grouping of his figures; the people he painted, beautiful shapes though they may be, lack vitality; and in his later work, in an effort to imitate the strong light and shade of Leonardo, he spoiled his own naturally clear and beautiful color.

THE MEN WHO MADE THE NAME OF FLORENCE FAMOUS FOREVER

A very different person was Andrea del Sarto, who lived from 1486 to 1531. In a way he was the rival of Fra Bartolommeo, and his technique and charm were such that he was known as the faultless painter. In a generation of geniuses Andrea was much admired—according to the later judgment of history, a little more than he deserved. When Michelangelo was in Rome talking to Raphael one day, he said, "There's a little man yonder in Florence who, were he employed on such great works as these, would bring the sweat to your brow." But we ourselves reserve such warmth of approval for Michelangelo's own work; the "faultless painter" leaves us pleasantly interested and admiring.

Andrea del Sarto had in his best work an extraordinary smoothness and sweetness. But he shows weakness in being imitative. He followed Leonardo's skillful blending of light and shade with color, but he had none of the great master's genius of insight into character; he aspired to Michelangelo's rugged grandeur, and simply formed a habit of making heavy draperies. His ideals were never lofty, for his mind had a tinge of commonness; but his painting, as painting, was exquisite. All his figures were bathed in a beautiful soft light.

ANDREA DEL SARTO SHOWS THE RARE SWEETNESS OF FLORENTINE ART

To study the work of this man is to realize how far Florentine art had gone in the journey away from archaism to sweetness and human freshness and loveliness. Religion still has a considerable place, but happiness has come into art, to stay, we hope, forever.

Two fine groups of Andrea del Sarto's—Charity and The Holy Family—are in the Louvre. But his work should be studied in Florence, where so much of it is treasured. There is a fresco of the Last Supper, at San Salvi, which attracts the eye even after looking at Leonardo's master-work on this subject; several frescoes in Santissima Annunziata, such as the Birth of the Virgin, show his skill in composition.

Like most Italian artists, Andrea del Sarto painted a number of Madonnas, and he stands out a little among his fellows in having created a new type of face for the mother of Christ. Two fine specimens are the Virgin in The Holy Family, in the Pitti Palace, and the Madonna delle Arpie, in the Uffizi. The faces in these pictures are characterized not so much by saintliness as by sweetness, charm, simplicity.

For most of them he used as a model his lovely and wayward wife, whose facial beauty was not the outward sign of a beautiful spirit. Whether we look at them from the point of view of the painter's rather unhappy attachment for an unscrupulously selfish and hard woman, or from the point of view of beautiful portraiture, or as pictures of the Virgin, they claim our admiration and mark a stage in the countless repetitions of the little Jesus and his mother.

WANDERING ARTISTS WHO GAVE BEAUTY TO THE TOWNS AND VILLAGES

Another Florentine painter who was busy about this time was Bronzino. He lived from 1502 to 1572, and is chiefly remembered for his portrait work. In Florence, where more of his works are to be seen than anywhere else, there are some charming portraits of little princes and princesses, painted by Bronzino—the first independent portraits of children made by a Florentine artist.

It is the habit to speak of Italian art in various "schools" of painting—the Sienese, Florentine, Umbrian, Venetian. These are, however, merely broad definitions. We should not necessarily think that artists worked wholly in the town or state to which accident of birth or the style of their work allotted them. Quite a number of them were wandering artists, going from town to town to see the work of other men, intensely curious, and eager to share the ideas of their neighbors. They would undertake a piece of painting

here, a fresco there, often finishing the work of some other man who had died.

The authorities of the towns and villages, generally speaking, were as eager to have their walls painted and buildings decorated as the artists were to do them. People cared intensely about beautiful things. A number of these artists never attained to any fame; some are what we might call half-great. Many well-known names appear as those of artists who worked here and there, going from town to town—Giotto, Fra Angelico, Gozzoli, Uccello, Filippo Lippi, Gentile da Fabriano, Piero della Francesca, Signorelli, Pinturicchio.

One of these, Gentile da Fabriano, who lived from 1360 to 1428, is known as the first painter of any merit of the Umbrian school. The artists of this little colony had much the same spirit as the Sienese: they were swayed more by feeling than by thought. Fabriano was what one might call a happy painter, loving to portray the joyous element in the life of the Middle Ages. Although his subjects are religious, his pictures really show knights and ladies, lovely dresses, flowers and plumes, pleasant fields and sunny skies. They sparkle with gold and color. His best-known picture is the Adoration of the Magi, in Florence.

THE TWO MEN WHO PREPARED THE WAY FOR RAPHAEL

After Gentile da Fabriano the men of the Umbrian school became indifferent, uninspired. A number of second-rate artists lived and worked in the district. Fiorenzo di Lorenzo is an Umbrian artist of this class. He was much influenced by the Florentines, and at one time in his life did some good painting in Perugia, the capital of Umbria. He is to be remembered chiefly through his two famous pupils Perugino and Pinturicchio, who, in their turn, prepared the way for the man who was the glory of Umbria, Raphael Santi (or Sanzio).

Perugino, who lived between 1446 and 1524, was the elder of the two by a few years. His real name was Pietro Vannucci. He is famous chiefly for his graceful, airy compositions and mastery of space management—qualities that belong to Umbria. There is a glow, a clear color in his work, a restfulness, a peace, which throughout a long lifetime of painting he never quite lost. For vigorous movement he had no aptitude whatever,

but he made up for that lack by his remarkable restraint and delicacy.

There are pictures or frescoes by him in almost every gallery in Europe, and a great number in his native Perugia. Two of his most famous works are a triptych in the National Gallery, London, and the Madonna with Saints and Angels, in the Louvre.

"Pinturicchio" means "little painter." The artist's own name was Bernardino di Betto. He has all the grace of the Umbrians, but little vitality. Like his fellow-artists, he painted an enormous number of religious subjects, in which he shows prettiness without much strength.

THE ARTIST WHO CREATED A NEW AND LOVELY TYPE OF MADONNA

Like Andrea del Sarto the Florentine, Pinturicchio painted lovely women as Madonnas, and stands out in the history of Umbrian art as a creator of a new type of this eternal subject. There are some large compositions of Pinturicchio's in the Libreria of Siena and the Borgia Rooms of the Vatican which show that, like Perugino, had the artist only possessed vigor equal to his grace, he would have been numbered with the great.

It is strange that about Raphael, at one time the brilliant follower of these two Umbrian masters, the judgment of history has not yet been finally pronounced. A very great deal has been written about the "divine painter," and until the middle of the nineteenth century a kind of worship was given him. The men who know most about art to-day are trying to judge him on the merit of his work, apart from the traditions clinging to his name.

RAPHAEL REVEALS THE GREATNESS AND BEAUTY OF HIS ART

There is no doubt that Raphael was a very great artist, but not in the sense that Michelangelo and Leonardo da Vinci were great. He had no share in the grandeur, the Titan-like vigor of Michelangelo; he had none of the deep insight into men and women that make Leonardo's few remaining masterpieces treasures of all mankind. But he was the greatest illustrator, the greatest space composer, the world has ever known. He saw figures of men and women in masses as beautiful patterns against the sky or the landscape, against the pillars, arches and walls of a building. He had genius for shaping vast spaces and filling a picture in such a masterly way that, while it may contain scores of

figures, it has a leisurely air—the leisenliness of time and eternity.

This, his peculiar greatness, the art of composition, was undoubtedly born in him; his styles of painting he owed to many men in turn. Raphael was extraordinarily receptive, sensitive to impressions, a born imitator; he could seize on the best in another man's work, thus drawing to himself, as to a magnet, the most alluring qualities of Italian art.

RAPHAEL'S WONDERFUL ACHIEVEMENTS IN A SHORT BUT BRILLIANT CAREER

In the year 1500, when Raphael was seventeen, he entered the studio of Perugino at Perugia, where Pinturicchio was head assistant. For four years he worked in the studio, very much influenced by the paintings of the two Umbrian masters. In 1504 he produced the masterpiece of his early manhood, *The Marriage of the Virgin*. This picture shows his growing genius for "piled-up" compositions, his sense of the beauty of space, his love for arched buildings as a background to groups. It is almost impossible to estimate the value of the space management of the famous painting. The group in the foreground would make a very different effect without the mounting steps in the middle distance, the domed temple surmounting the picture, the tiny figures quietly coming and going.

By this time Raphael's fame was established and he entered the years of crowded work that ended only with his death at the age of thirty-seven. Even allowing for the fact that his pupils and assistants helped largely in many of the pictures which bear his name, Raphael produced an astounding number of pictures and frescoes. His achievements are the more remarkable because he was something of a social "lion," the favorite of the great.

HOW RAPHAEL FOUND SCOPE FOR HIS GENIUS AT THE VATICAN

It soon became the fashion to talk about Raphael, admire him, follow him about. The inevitable result of this hero-worship was that the artist had to spend much time in society, away from his work.

After his period of work in Perugino's studio Raphael went to Florence for four years, and during that time fell under the influence of Leonardo da Vinci, Michelangelo and Fra Bartolommeo. While at Florence he painted a great number of his exquisite pictures of Mary and the Child, such as the *Madonna in Munich*. There

is something of unearthly sweetness in these heads of Mary, something that appeals to the emotion and is saved from over-sweetness only by Raphael's exceeding grace.

In 1508 the artist was called to Rome by Pope Julius II, and from that time found it almost impossible to keep up with commissions for work which came to him. He was obliged in very many cases to content himself with making the cartoon for a picture, leaving his assistants to "paint it in," and then giving the finishing touches himself.

His great work, on becoming artist to the papal court, was the decoration of some of the Vatican apartments—the Stanze—and the Loggie of one of the courtyards. Here Raphael's genius at composition had full scope. When we consider the numerous pictures in the Stanze, it would seem that any one of them might almost have been the work of a man's lifetime. Hundreds of figures are grouped and painted, all looking as if they could not possibly have been placed anywhere else, and yet each subordinate to the magnificent whole.

THE PAINTER WHO BLENDED THE PAGAN WORLD AND THE CHRISTIAN STORY

You know that there are crowds of people in these pictures, but your eye seeks the one place and person, or two persons, it was the artist's intention you should seek; and that is the highest genius of figure management in a composition. The subjects of the Stanze were taken from stories of history, allegory and religion. In the Loggie are frescoes mainly from Old Testament history. They are affectionately known as Raphael's Bible, but we know now that the master himself did not do very much of this work.

There was something miraculous in the energy of this young man. In the midst of almost inexhaustible demands on his time he succeeded in finding leisure to paint some very fine portraits.

It is probable that as time goes on Raphael will be remembered chiefly for his Vatican pictures and his lovely *Madonnas*. By these he is forever set apart. No other painter has blended so marvelously the pagan world and the Christian story, or thus brought the spirit of the whole Renaissance to rest within one lifetime.

THE NEXT STORY OF THE FINE ARTS IS ON PAGE 1103.

PAINTINGS OF THE TIME OF RAPHAEL



THE MADONNA DEL GRANDUCA, BY RAPHAEL. IN THE PITTI PALACE, FLORENCE



THE SISTINE MADONNA, BY RAPHAEL,
IN THE DRESDEN GALLERY



CATHERINE OF ALEXANDRIA, BY PINTURICCHIO,
IN THE NATIONAL GALLERY, LONDON



POPE JULIUS II, BY RAPHAEL, IN THE NATIONAL
GALLERY LONDON



THE MADONNA AND CHILD, BY RAPHAEL
IN THE PRADO MADRID



THE MADONNA AND CHILD, BY RAPHAEL
IN THE PINAKOTHEK, MUNICH



LA BELLE JARDINIÈRE, BY RAPHAEL. IN THE
LOUVRE, PARIS



THE HOLY FAMILY, BY RAPHAEL, IN THE
PITTI PALACE FLORENCE



FERDINAND DE MEDICI, BY BRONZINO IN THE
UFFIZI GALLERY FLORENCE



THE GRAND DUCHESS ELEANOR,
BY BRONZINO, IN DRESDEN



BALTHASAR CASTIGLIONE, BY
RAPHAEL, IN THE LOUVRE



PIERO DE MEDICI, BY BRONZINO
NATIONAL GALLERY, LONDON



THE MADONNA OF THE CHAIR, BY RAPHAEL, IN
THE UFFIZI GALLERY



THE VIRGIN AND CHILD, BY PERUGINO,
IN THE LOUVRE, PARIS



ST. JOHN THE BAPTIST, BY
ANDREA DEL SARTO, FLORENCE



RAPHAEL, BY PINTURICCHIO,
IN SIENA CATHEDRAL



ST. JOHN IN THE DESERT BY
RAPHAEL FLORENCE

WHAT THIS STORY TELLS US

YOU boys and girls who live in North America to-day will probably think the life of the children of two hundred years ago a very hard and dull affair. But though our colonial ancestors in their childhood days had fewer toys, fewer privileges and less freedom than the boys and girls of to-day, it is not at all certain that they were less happy. In this article we shall learn of the sharp discipline administered to naughty children by stern schoolmasters and not less stern parents; we shall hear how the tithing man rapped their heads when they were restless in church and indignantly tickled their noses when they fell asleep during the four-hour sermon; we shall see the children in the school and at home, in the village meeting-house and at their sports in different parts of the country.

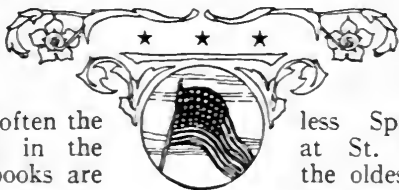
CHILD LIFE IN COLONIAL DAYS

HAVE you ever thought how much is done for children in these days? The school is often the most costly building in the town; thousands of books are printed for them, toys are made by the million, and amusements of every kind are provided for them. This was not the case when the country was young. Then children were "expected to be seen and not heard," and they were expected also to obey without any question.

There is no doubt but that parents loved their children then as much as they do now, but they were afraid of spoiling them by too much indulgence. In the earliest days of the colonies, life was hard for everyone, and children had to do without things as well as everyone else. Yet we know that these children were not unhappy, and we find that not all of them were good, in spite of the severe punishments. Let us see how these children lived and how their life differed from that of their descendants in our country to-day.

SNORRO AND VIRGINIA DARE, THE FIRST WHITE CHILDREN

So far as we know, the first child born in America was the little Norseman Snorro, who was born about 1007, as we learned in another story. He went back to Europe when three



years old, however, and so hardly counts as an American child.

There were doubtless Spanish children born at St. Augustine, which is the oldest town in the United States, but the next child of whom we shall speak was the first English little one born in the New World. This was little Virginia Dare, born in 1587, on Roanoke Island, now a part of North Carolina. Sir Walter Raleigh was trying very hard to found a colony in this region, which he called Virginia in honor of Queen Elizabeth, the Virgin Queen, and the little girl was named for the country. Before little Virginia was three years old, the colony disappeared, and no one knows to this day what became of it. We shall tell in another place all that is known of the "Lost Colony of Roanoke."

CHILDREN BORN ON THE MAYFLOWER

Years after this a small ship called the Mayflower was crossing a cold and wintry sea with a little band of Englishmen seeking homes in the new land. Two new baby boys had been added to their number, and almost everyone on board ship was crowding into the dark little cabin, anxious to help the parents to choose names for the tiny fellows. It was at last decided that they should be called Oceanus and Peregrine. The first

name is the Latin for ocean, and the second means wanderer. The names seemed to fit, as the children had been born on the ship near the close of the wanderings of the Pilgrims.

"Oceanus! Peregrinel! What very odd names for children!" you exclaim. Yes, indeed, and very odd names many of the children were given who were born in New England in the days of long ago. Parents chose names from the Bible, or else gave the names of the Christian virtues to their children. Some showed the conditions under which the little ones had come into the world. Large families were the rule in those days, sometimes as many as ten or fifteen children. Many of them bore such names as Deliverance, Temperance, Hope, Patience, Truth, Faith, Isaiah, Jeremiah, Preserved and so on.

HARDSHIPS OF THE COLONIAL CHILD

But if the names were strange the manner of their bestowal seems far more so. "Half the Puritan children had scarce drawn breath in this vale of tears ere they had to endure an ordeal which might well have given rise to the expression, 'the survival of the fittest.' All were baptized within a few days of birth, and baptized in the meeting-house. We can imagine the January babe carried through the narrow streets or lanes to the freezing meeting-house, which had grown damper and deadlier with every wintry blast, to be christened, when sometimes the ice had to be broken in the christening bowl. It was a cold and disheartening reception these children had in the Puritan church; many lingered but a short time there. Indeed from the moment when the baby opened his eyes on the bleak world around him, he had a Spartan struggle for his life." Those that survived were usually very hardy. As soon as a child was two or three years old, his small shivering feet were daily dipped into a tub of icy cold water to make them tough. Many parents for the same reason believed that their boys should wear shoes "thin enough that they may leak and let in ye water."

SCHOOLS AND SCHOOLDAYS IN THE COLONIES

At first, in most of the colonies there was little regular education of the children. The boys learned at home how to read and write and the girls to sew,

but there were no schools; the men were too busy making homes and providing food for their families to think of the matter. But in the hearts of our forefathers was a deep-seated reverence for education, and presently people began to build schoolhouses. Then here and there, wherever there were towns, schools were started. In Massachusetts every town of fifty families was compelled by law to keep a school for boys, but nothing was said about girls. The buildings sometimes were small, uncomfortable log cabins; the books were few and tiresome, and the schoolmasters were often not good teachers. Yet nothing could weaken the ambition of the parents to have their children educated. "Child," said one noble New England mother of long ago, "if God make thee a good Christian and a good scholar, 'tis all thy mother ever asked for thee."

So the children, whether they wished it or not, were packed off bright and early each morning to the schoolhouse, with their spellers or their arithmetics tucked under their arms. The rules for one school in New England required school to begin at seven o'clock in summer and at eight in winter. The older boys and girls sat at rude desks made of boards resting on pegs driven into the floor, which was sometimes of earth. The younger pupils sat on blocks or benches of logs. Few of the seats had backs.

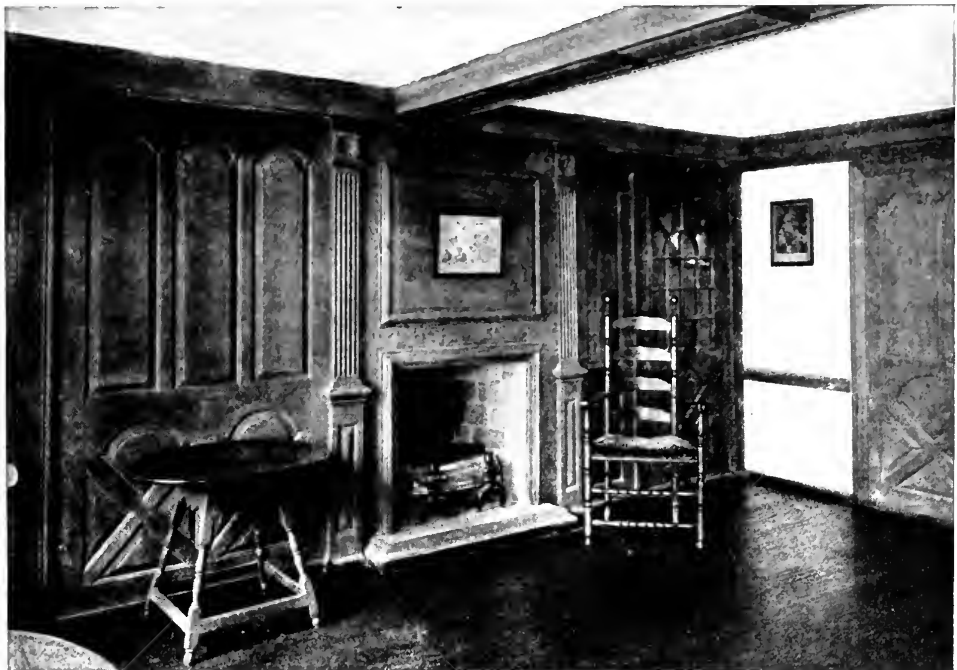
SOME TEACHERS AND HOW THEY LOOKED

Usually the boys and girls began in a school kept by a woman in her own home. This was called a "dame school." Then the boys were transferred to a school kept by a man, for at first little attention was paid to the education of girls beyond reading and writing. In New England the ministers were often teachers as well. The same was true of some parts of the South. These ministers were usually college graduates, who taught Latin and Greek well, and were much respected. In other colonies the position of the teacher was lower. Once in New York the town council advertised for a man to act as clerk, serve as sexton of the church, ring the bell, dig graves, lead the singing in church, and teach the children. Sometimes the teacher was a man who had failed at everything else he had tried. Often,

OLD ROOMS WHERE CHILDREN LIVED



In the houses of very early settlement days the kitchen served almost every purpose. Imagine yourself sitting beside the fire to guard the baby asleep in its cradle and to watch the pot boiling. This room is from the Capen house at Topsfield, Massachusetts, built about 1683.



Before the middle of the next century, the eighteenth, life in the colonies was less difficult. Compare this room with the one above. Notice the gracefully paneled walls, the pictures, and the furniture showing greater skill and finish.

Photos, courtesy Metropolitan Museum of Art.

however, he had a very good opinion of himself.

The appearance of one of the schoolmasters of "ye olden days" is thus described: "He wore a tabby velvet coat, the tails of which stood sometimes straight out. Inside the coat was a waistcoat of tremendous length, through which showed conspicuously the nicely starched ruffles of his white shirt. His knee breeches of velvet like his coat, were finished at the knee by large and shining silver buckles. With these in lustre, vied two more silver buckles which rested on the top of his clumsy shoes. Around his neck was wound, just once and a half, a stiffly ironed stock, which helped to keep his head stiff and straight, as became a teacher in his day. But, above all, his crowning glory was his wig, the white powdered wig, combed straight back from his forehead, and hanging always in a nicely braided queue behind." The custom of wearing the hair in a queue lasted until the Revolution.

HOW THE CHILDREN THEMSELVES WERE DRESSED

To modern boys and girls the children's clothes would seem every bit as odd as those of the schoolmaster. The girls were arrayed in stiff homespun linsey-woolsey petticoats and bodices. Linsey-woolsey was a rough cloth, half linen and half wool. About their throats they wore white kerchiefs and at their wrists white cuffs. The Puritan maidens wore demure little caps such as you can see in any picture of the Pilgrim mothers. The boys wore knee breeches, long waistcoats and heavy coats with wide pockets and wide turn-over cuffs. The children of well-to-do parents who were not Puritans frequently wore ruffles of fancy white linen at their necks and wrists.

Sometimes boys were sent away from home to a relative who lived near the school, and providing a suitable wardrobe was a difficult problem. One old lady who was boarding her grandson during the school term wrote home to his father in deep distress: "Richard weares out nigh twelve paires of shoes a year. He brought twelve hankers with him and they have all been lost long ago; and I have bought him three or four at a time. His way is to tie knottys at one end and beat ye boys with them & then to lose them & he cares not a bit what I will say to him."

THE SCHOOLROOMS AND THE LESSONS

School opened with prayer, after which the children began their reading, writing, spelling or arithmetic lessons, as the case might be. Paper was scarce and high, and lead plummets were used instead of pencils. The children did their problems or copied their writing into notebooks made of foolscap paper sewed into book shape and carefully ruled by hand. "Among the thrifty Scotch-Irish settlers in New Hampshire and the planters in Maine, sets of arithmetic rules were copied by each child on birch bark."

At eleven o'clock the bell rang for recess, and the children, delighted to stretch their legs, and shouting to each other as they ran, scampered off home, not to return until one o'clock. Those who lived too far away brought their dinner, just as some children do in the country now. The afternoon session lasted until four or five, and school closed, as it had opened, with prayer. On Wednesdays and Saturdays they learned and recited the catechism, or the prayers from the prayer book, in some colonies.

METHODS OF DISCIPLINE IN THE OLD-TIME SCHOOLS

"Spare the Rod and Spoil the Child," was the motto of every parent and every teacher. The discipline in the school was very severe. Boys who did not learn their lessons or were impertinent to their master were soundly flogged and, as this happened not infrequently, the schoolroom continually resounded with the swish of the birch rod. Often, too, our stern great-grandfathers whipped their sons because they had been whipped at school. Children were taught to obey their parents according to the commandment, without arguing and objecting. An early law of Connecticut fixed the penalty of death upon any son who should strike his parent.

In the "dame schools," as the schools kept for little folks by a woman were called, some of the methods of punishment were quite novel. The schoolmistress would go about among the benches and briskly tap the heads of idle children with a heavy thimble she always wore on her finger. Lying was punished by applying hot mustard to the tongue of the offender; whispering met the unpleasant fate of being gagged with a small wooden board; stupid chil-

SOME COSTUMES OF OUR ANCESTORS



These portraits of Johanna and Johannes de Peyster, baby brother and sister, were made in Holland about 1621. At the age of twenty-five Johannes came to New Amsterdam, where he took an active part in public life, thus setting an example for a long line of patriotic citizens bearing his name. The paintings are reproduced by permission of Mrs. Anna Short Jones and Mr. Frederick de Peyster.



Little Dutch children of the New Netherlands in the seventeenth century were dressed somewhat like Johanna and Johannes, above. A girl baby of English parents, in the eighteenth, would wear frock and cap like this child in her mother's lap, painted by Ralph Earle. On the left is a grandmother in cap, kerchief and mitts, painted by John S. Copley.

Photos, courtesy Metropolitan Museum of Art.

dren were made to stand upon a tall "dunce" stool, and any child who was so wicked as to be guilty of stealing had his small fingers burned with red hot coals.

REWARDS AND PUNISHMENTS IN THE OLD SCHOOLS

Among other modes of punishment were strapping tender hands with leather thongs with holes in the middle, and pinching the ear-lobes and noses of naughty children with pieces of wood shaped like clothespins. In some of the schools, good and industrious children sometimes received such rewards of merit as a portion of a strawberry divided among three or four pupils, or had a red, pink or blue bow tied to their shoulders to wear home to show their proud parents. In schools where these were used a black bow was pinned upon a naughty child, with the usual consequence of a whipping administered at home.

A writer of 1750 says, in commenting on his schooldays: "When I was three years old, I was sent to school to a mistress, where I learned to read with neat dispatch; in my fifth year, I was taken away and put to a writing master. In my seventh year, I flourished a tolerable hand and began my grammar. By the time I was fourteen I was considerably proficient in the Latin and Greek languages and was admitted into Harvard." Perhaps it was owing to the early age that our ancestors were sent to school, and the fact that they entered college while mere boys, that corporal punishment was in vogue in the higher educational institutions.

COLLEGE STUDENTS WERE SOMETIMES WHIPPED

Students at college were often publicly thrashed. Among the rules of Harvard College published in 1660 was this:

"It is hereby ordered the president and fellows of Harvard College have the power to punish all misdeeds of the young men of their college. They are to use their best judgment and punish by fines or whipping in the hall publicly, as the nature of the offense shall call for."

That such punishment was not always wholly undeserved is shown by the following grim comment upon misdemeanors of students in that college:

"M——, H—— & W—— were ex-

pelled from college and their names cut out of the tables in the dining-room by order of the president of the college; this was done before all the fellows interested. It was because of the disorder and bad actions of these three young men towards Andrew Belcher. They killed Grandma Sell's dog and stole ropes with which to hang him. They hung him upon a sign post at night, as one of them afterwards confessed before the college authorities and before his comrades. And at the time it was not denied in any way; but two of the students afterwards had the third one say that after all that what he had related was not true. Many great lies were told by all of them and especially by one. And there were many reasons for the belief that they committed these crimes."

TUTORS ON THE PLANTATIONS IN THE SOUTH

In the South there were few towns, and most of the people lived on farms or plantations, often at some distance from neighbors. Therefore it was common for planters to employ tutors for their children. These private tutors were often of a much higher grade of intelligence than the teachers at the ordinary schools, as they were usually college graduates or students. Often the owner of a Southern plantation would hire a tutor for his sons and daughters, and invite the parents on neighboring estates to send their children.

Here is an interesting extract from the diary of a young Princeton graduate who went down to Virginia to be the tutor of the children of the wealthy Carter family in 1773.

"Monday, November 1st. We began school. The school consists of eight. Two of Mr. Carter's sons, one nephew and five daughters. The eldest son is reading Sallust; grammatical exercises and Latin grammar. The second son is reading English grammar and reading English writing, and ciphering in subtraction. The nephew is reading and writing as above: and ciphering in reduction. The eldest daughter is reading the Spectator, writing, and beginning to cipher. The second is reading now out of the spelling-book, and beginning to write. The next is reading in the spelling-book. The fourth is spelling in the beginning of the spelling-book. And the last is beginning her letters.

FAMILY GROUPS IN PORTRAITS



The little girl in the picture above is leaning against her grandmother's knee, just as many little girls have done in this old world. It is her grandfather in the other portrait. The costumes are in the style of the late eighteenth century, and the likenesses were painted by Charles Willson Peale, an American artist.



George Washington, years before there were any United States or any presidents in America, had married Martha Custis, a young widow. This portrait, painted by Edward Savage, shows the two, late in life, with Mrs. Washington's grandchildren, Eleanor and George. Billy Lee, a faithful negro servant, stands in the background.

Photos, courtesy Metropolitan Museum of Art.

A DAY ON A SOUTHERN PLANTATION

"In the morning so soon as it is light a boy knocks at my door to make a fire. After the fire is kindled, I rise, which now in the winter is commonly by seven or a little later. By the time I am drest the children commonly enter the school-room, which is under the room I sleep in. I hear them round one lesson, when the bell rings for eight o'clock (for Mr. Carter has a large good bell which may be heard for some miles), and this is always rung at meal times); the children then go out; and at half after eight the bell rings for breakfast, we then repair to the dining-room; after breakfast, which is generally about half after nine, we go into school, and sit till twelve when the bell rings, and they go out for noon; the dinner bell rings commonly about half after two, often at three, but never before two. After dinner is over, which in common, when we have no company, is about half after three, we go into school, and sit till the bell rings at five, when they separate till the next morning. We go into supper commonly about half after eight or at nine, and I usually go to bed between ten and eleven.

THE DANCING-MASTER MAKES A VISIT

"Saturday, December 18. After breakfast, we all retired into the dancing-room and after the scholars had their lesson singly round, Mr. Christian very politely requested me to step a minuet; I excused myself, however, but signified my peculiar pleasure in the accuracy of their performance. There were several minuets danced with great ease and propriety; after which the whole company joined in the country dances; and it was indeed beautiful to admiration, to see such a number of young persons, set off by dress to the best advantage, moving easily to the sound of well performed music, and with perfect regularity, tho' apparently in the utmost disorder. The dance continued till two, we dined at half after three. Soon after dinner we repaired to the dancing-room again. I observed in the course of the lessons, that Mr. Christian is punctual, and rigid in his discipline, so strict indeed that he struck two of the young misses for a fault in the course of their performance, even in the presence of the mother of

one of them. And he rebuked one of the young fellows so highly as to tell him he must alter his manner, which he had observed through the course of the dance to be insolent, and wanton, or else absent himself from the school."

The number of people who could afford tutors was small, and the children of the smaller farmers in the South had poor opportunities of gaining an education. There were some good academies, but the children who went to school at all, for the most part, attended little neighborhood schools, which were badly taught.

CHILDREN'S WORK IN THE DAYS LONG AGO

But all children did not have an easy time. Except where the parents were wealthy, the children at a very early age were expected to do their share of the house and farm work. Captain John Smith wrote of fishing before there were many children in New England: "He is a very idle boy who has passed the age of twelve years and cannot do as much; and a girl is very stupid who cannot spin a thread to make nets to catch the fish. What pleasure can be greater, when people are tired with work on shore, whether they have been planting vines, or building houses or ships, than to get recreation for themselves before their very doors, in their own boats upon the sea. There man, woman and child, each with a small hook and line, may take divers kinds of excellent fish at their pleasure. And is it not a pretty sport to pull up two-pence, six-pence, and twelve-pence as fast as you can haul and change a line? He is a very bad fisher who cannot take one day with his hook and line one, two or three hundred cods. These, dressed and dried, if they be sold here in New England will bring ten shillings for a hundred; or in England, more than twenty. If a man work but three days in seven he may get more than he can spend unless he is very wasteful."

EVERY HOUSE ALSO A SORT OF FACTORY

You must remember many of the things which we now buy in the shops were then made at home. The mother then spun the wool or flax into thread, and wove it into cloth and made the clothes for the family. She knit the stockings and even made hats. She pickled and preserved, dried fruit, and

PLAYTHINGS LEFT FROM LONG AGO



DOLLS ONCE DEAR TO LITTLE GIRLS OF THE EIGHTEENTH CENTURY



A LITTLE CHAIR AND SOMEONE'S PRECIOUS TOY COACH

Photos, courtesy Metropolitan Museum of Art.

even made the soap and candles for family use. In this she was of course helped by her daughters, who had their work given to them when very young.

The father was a farmer, and often carpenter, tanner, shoemaker and blacksmith as well. The boys had their work on the farm as soon as they were able to help. They took care of the animals, giving them water and food; chopped the wood for the great fireplaces, and tended the fires; brought in the corn and hay from the fields and put them away in the barn; and when they were old enough, plowed the fields. Such a state of things always exists in a new country, and in some parts of the United States has not entirely disappeared yet.

THE SABBATH IN OLD NEW ENGLAND

In New England the observance of Christmas Day was forbidden as "unseemly to ye spiritual welfare of ye community." William Bradford, governor of the colony of Plymouth, grimly commented upon the first Christmas.

"The day called Christmas Day, the governor called them out to work (as was used), but most of this new company excused themselves and said it went against their conscience to work on that day. So the governor told them that if they made it a matter of conscience he would spare them until they were better informed. So he led away the rest and left them; but when they came home at noon from their work, he found them in the street at play openly, some pitching the bar, and some at stool ball and such like sports. So he went to them and took away their implements and told them it was against his conscience that they should play and others work."

"But," you perhaps are thinking, "there was at least one day of the week in which the children could be free from the discipline of parents or schoolmaster"—and you remember the many pleasant Sunday afternoons of your own life. But Sunday for the boys and girls of New England was a day of restraint. The Puritans brought with them to this country a fixed idea that the first day of the week, the Sabbath, should be strictly observed. Even in Virginia and New York, where the people were not so strict, there were rigid laws for the ordering of one's conduct on the Sabbath Day. "In Massachusetts the law provided that no

person should be permitted to walk in the streets on Sunday, except in reverently going to church or returning from the services."

CHURCH SERVICES LASTING ALL DAY

Both in the North and in the South it was the custom to have two or three religious services during a single Sunday, with a long recess at noon for luncheon. In New England and some of the other colonies there were little houses or shanties built near the meeting-house, so that people might be kept warm and dry during dinner. These were called "noon houses." You can well imagine that the children did not always find Sunday a welcome day.

In the early history of the country it was thought wrong to have a fire in the churches on the Sabbath. A few delicate persons had footstools in which hot coals and ashes were placed, so that their feet might not freeze entirely, but all others were expected to endure the cold.

The Sabbath began in New England at sunset on Saturday afternoon, when all work was stopped and the children's play hushed to prepare their minds for the coming of the Sabbath. Next morning the whole family arose early. No work, except such as was absolutely necessary, was done. No hot meals were prepared. The dishes were left unwashed until Monday morning. Whether the weather was stormy or fair, the entire household, save the tiniest children and someone to mind them, set out for the meeting-house, sometimes several miles distant. In the earliest days, as they approached the meeting-house through the woods, their Bibles under their arms, the men often carrying their guns, they could hear the muffled beat of a drum through the Sabbath hush. It was the call to prayer.

When they entered the church, the children were separated from their parents, the boys going into one pew and the girls into another. The service was a long one, the sermon sometimes lasting three or four hours. Do you wonder that the boys got restless and the girls sleepy? But woe betide the unlucky child who chanced to close his eyes. All of a sudden down would come the tap, tap, of a knobby pole upon his head. It was the "tithing man," whose duty it was

to keep order during the church service. Now he tickled the face of a sleepy little girl with the fox-tail on the end of his pole, now he smartly rapped the skull of an unruly small boy.

HOW THE BOYS WERE KEPT IN ORDER IN CHURCH

That the boys were unruly is proven by the records of their time. One reads, thus: "We of Medford do pass an order that all small boys who cut the seats in the meeting house shall be persecuted." Tithing men and constables were appointed especially to watch over the "pue of ye wretched boys" to "see that they behave comlie, and use such raps and blows as shall be meet." Another record reads: "His majesty's Tithing man entered complaint against Jona and Susan Smith, that on the Lord's Day during Divine Service they did smile. They were found guilty and each was fined five shillings and costs."

In early days in New England the Sabbath ended at sunset on Sunday, twenty-four hours after it began. This custom grew out of the fact that the Jewish Sabbath, of which we read in the Bible, began at sunset. You know, of course, that the Jewish Sabbath begins at sunset on the day of the week which we call Friday.

There were Sabbaths when the snow was white and thick on the ground, and the air was crisp and clear, that proved a "temptation of ye Devile" to many boyish hearts, and they fell by the wayside and went "sleeing." This roused the deep wrath of the Albany authorities, and they passed a law forbidding such "unseemly wickedness."

"Whereas the children of the said city do very unorderedly, to the shame and scandal of their parents, ride down the hills in the streets of the said city with small and great sleds on the Lord's Day . . . now for preventing the same it is hereby published and declared it shall and may be lawful for any constable in this city to take any such sled or sleds from all and any such boys and girls riding or offering to ride down any hill within the said city and break any sled or sleds in pieces."

Moreover, it was ordered that the officer seize the cloak or upper garment of the offenders and present them to the parents to be redeemed on the payment of a fine of five shillings.

MANY KINDS OF GAMES PLAYED BY CHILDREN

The games played by the children were different in different sections of the country. At first the Puritan children were brought up to look upon wholesome games and frolic as deadly sin. Football, especially dear to boyhood hearts, was pronounced a game "wherein is nothyng but beastlye furie and exstreme violence." As the years went on, the people of New England grew more tolerant, and did not look so seriously upon childish play. During the fifty years before the Revolution the rules were not so strict. The Dutch settlers had many games. They were very fond of bowling on the grass. A well-known little park in New York, Bowling Green, shows the popularity of the game that was played there. They also played "tick-tack," a complicated sort of backgammon, and "trock," on a table somewhat like a billiard table, in which an ivory ball was struck under wire wickets with a cue. Coasting down hill became a popular sport. The sleds were low, with a rope in front, and were started and guided by a short stick. The children played with marbles, tops, hoops, kites, balls, even as do the boys and girls of to-day. Such familiar games as prisoner's base, hop-scotch, tag and leap-frog were well known. Running on stilts was a favorite diversion.

ANOTHER BIT OF THE YOUNG TUTOR'S DIARY

In the South, as in New York, good times were more common. Dancing was considered a very important thing to know. Our forefathers, however, knew nothing of round dances. The stately minuet, the quadrille, the Virginia Reel, and a number of "country dances" were among their favorites. The young tutor, a bit of whose diary we have already read, writes thus of Virginia days: "Nothing is now to be heard of in conversation but the balls, the fox-hunts, the fine entertainments, and the good fellowship, which are to be exhibited at the approaching Christmas. Mr. Goodlet was barred out of his school last Monday by his scholars, for Christmas holidays, which are to continue till twelfth-day; but my scholars are of a more quiet nature, and have consented to have four or five days now, and to have their full holiday in May next.

"When the candles were lighted, we

all repaired into the dancing-room; first each couple danced a minuet; then all joined as before in the country dances; these continued till half after seven, when at the proposal of several, we played Button, to get pawns for redemption: here I could join with them, and indeed it was carried on with sprightliness, and decency; in the course of redeeming my pawns I had several kisses of the ladies! Half after eight we were rung in to supper. The room looked luminous and splendid: four very large candles burning on the table where we supped; three others in different parts of the room; a gay, sociable assembly, and four well instructed waiters. So soon as we rose from the supper, the company formed into a semi-circling round the fire, and Mr. Lee, by the voice of the Company, was chosen Pope, and the rest of the company were appointed Friars, in the Play called 'Break the Pope's Neck.' Here we had great diversion in the respective judgments upon offenders, but we were all dismissed by ten, and retired to our several rooms."

In the South the boys had much healthful out-of-door sport. They went hunting with their fathers or with the negro men, and learned the habits of the birds and animals. They were taught to ride, to shoot and to fish, and, when they grew older, went fox-hunting with their elders. To go hunting the "possum" or the coon at night was great sport, and every boy had his traps or snares for rabbits. Girls also were taught to ride, for many of the roads were often so rough that carriages could not be used.

Many of the old negroes were full of stories of beasts and birds, which had probably been brought from Africa with the slave-ships, though, of course, the animals were different. In these stories the animals were made to talk, think and act like human beings. The Uncle Remus Stories, by Joel Chandler Harris, are the stories which were told to children in colonial days, as well as to their great-grandchildren.

SWEETMEATS OF MANY KINDS WERE KNOWN

There were pleasant things in the life of the colonial child. In the seaport towns sweetmeats seem to have been plentiful. Ships brought an abundance of sugar and molasses, chocolate and ginger into all the ports. One colo-

nial shop bore this quaint sign upon its door:

I have Sucket, Surrip, Grene Ginger and Marmalade Bisket, Cumfet, and Carraways as fine as can be made.

Apparently such toothsome dainties were far more common in the colonies than in England, for one writer says that it was in these long-ago days that the foundation was laid for the "American sweet tooth—a wonder!" Then, too, the colonists learned very early to make maple sirup and maple sugar, and you may be sure that the children had their share of these. "Boys and girls who were fortunate enough to live in coast towns reaped the sweet fruits of their father's foreign ventures. When a ship came into port with eighty boxes of sugar candy on board and sixty tubs of rock-candy, poor, indeed, was the child who was not surfeited with sweets. There was a sequel, however, to the toothsome feast, a bitter dessert. The ship that brought eighty boxes of sugar candy also fetched a hundred boxes of rhubarb and ten of senna." And you may be sure the wise parents did not spare the bitter dose.

The value of a medicine was then judged according to its bitterness. Nowadays the effort is made to make all medicines tasteless or even pleasant to take. But in those days the sugar-coated pills, or the little gelatine capsules which conceal the bitter or nauseous dose had not been invented. Many of the medicines given were made from herbs such as tansy, thoroughwort, sage and pennyroyal. A mixture of sulphur and molasses was supposed to be good for the blood, and the other doses were hardly less unpleasant.

ARE CHILDREN HAPPIER TO-DAY?

Though it seems that the life of the children about whom we have just read was not very interesting, on the whole they were probably happier than children to-day. They did not have so many toys, and not so much was done for them, but they knew how to get pleasure out of simple things, and the simple pleasures are, after all, the sweetest. They did not expect to have every whim gratified, but gratified others, and there is more pleasure to be found in doing things for others than in having things done for us.



WHY DOES A BALL BOUNCE?

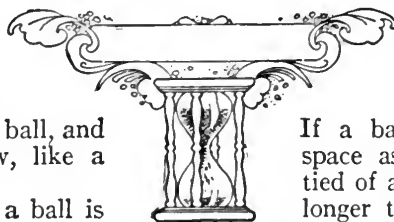
THERE are two kinds of balls that bounce—those that are solid, like a rubber ball or a golf ball, and those that are hollow, like a tennis ball.

No matter whether a ball is solid or hollow, its bounce is due to the fact that it is what we call elastic. This simply means that when the ball is pressed out of its shape it tends to return to the shape it had at first.

We must not think, however, that only rubber is elastic. On the contrary, steel is much more elastic than rubber, and, as can easily be proved, steel balls bounce splendidly.

Into almost every question we can ask there comes, sooner or later, the greatest and deepest law of all science, which is that nothing is lost or created, and that everything has to be paid for.

When the ball starts bouncing it has a certain amount of motion in it, which is force, or power, or energy. When it stops, that has gone. Either we must show that the energy has gone somewhere and has not been destroyed, or, according to the great law of the persistence of power, the ball should bounce forever. If it did not bounce forever, the law would be false. It is, however, quite easy to show that the ball does lose the power with which it started. To begin with, it is moving, both up and down, through the air, and forcing millions of par-



ticles of air aside. All the motion it gives to them it loses.

If a ball were bounced in a space as far as possible emptied of air, it would bounce far longer than it does in the atmosphere, just as a top will spin longer in the same circumstances. Suppose that, instead of bouncing the ball on something hard, we bounce it on a pillow or on loose sand. It will not bounce long in such a case. Its power has gone to move the pillow or the sand as well as the air. The ball itself, too, is not quite elastic, nor is the ground. If the ball and the ground were quite elastic, and there were no air to move, and the ball never turned and rubbed the ground in falling, it would bounce forever.

In the case of a hollow rubber ball, it is not by any means the rubber only that explains why the ball is so elastic. The ball is filled with a mixture of several gases, which we call air. We can see how much this ball bounces if we compare an ordinary soft rubber ball with another one which has a small hole in it.

The air is expelled from the hole when the ball is bounced, and we find that it bounces very little, because the elasticity of the ball is so poor. But the other ball bounces exceedingly well, because, when it is bounced, the air in it is not squeezed out.

HOW DOES A SOFT CLOUD MAKE A NOISE WHEN IT THUNDERS?

It is not the clouds bumping against each other that makes thunder. Certainly clouds are much too soft to make a noise when they do that. They are, indeed, too soft to bump at all, but simply mingle with each other. The thunder is due to the disturbance of the air when electricity passes from one cloud to another, or from a cloud to the earth. As it passes it makes the air near it very hot, and so starts a wave in it which we hear and call thunder.

WHY DO WE EVER STOP GROWING?

What we call growth is the power the cells of the body have of taking nourishment into themselves and so becoming larger, and of dividing and giving rise to other cells like themselves. This power, however, is limited, and every kind of cell can grow only within the limits of its own law—the law of growth. No matter how much food or exercise is taken, the law of growth prevents any number of cells becoming more numerous or larger than a given limit. When the body is young the growth is very active, but as the body grows older the limit of growth is gradually reached, and growth stops.

DO ANIMALS TALK TO ONE ANOTHER?

People used to think that only human beings could talk to each other, and there is no doubt at all that no other creatures can talk one thousandth part as well as we do. But no one who knows animals now doubts for a moment that many kinds of animals can talk to each other—only they do not use our kind of talking.

Monkeys, for instance, make many kinds of sounds with their mouths which have different meanings; only they do not express ideas or make assertions that the earth is round; but they express their feelings. A baby expresses various feelings with its mouth long before it can talk, and so many animals can express fear, joy, anger and many other feelings with their voices, and their fellows can understand them. That is talking of a kind.

But though monkeys probably come nearer to us in talking—though still very, very far away—than any other animals, many insects, which are very simple and humble creatures compared with monkeys, can talk wonderfully

in their own way, especially the social insects, like ants and bees and wasps. If they could not tell each other what they felt and wanted, they could not live together in societies as they do—societies, remember, from which human beings have a lot to learn. The insects have long “feelers,” with which, as it seems, they can touch each other and say what they want to do or how they feel.

HOW DOES THE STONE GET INTO THE PLUM?

This question is answered if we watch what actually happens in nature.

A plum is the last stage of a long series of changes that happen in the flower of the cherry tree or the plum tree. After these flowers have been fertilized—which means made fertile, or capable of producing something—they begin to change. If we look on, we may think that the flower is dying. The beautiful petals fall off, not because any harm has come to the flower, but because the petals are no longer wanted.

Then a little hard thing with a tough skin appears, and that is really the fruit. But at this stage it consists of hardly more than the stone and the skin covering it. But there is a layer of very active cells which lie between the stone and the skin, and they produce the flesh of the fruit, for which we prize it. Birds prize it, too, and so they eat the fruit, and in so doing carry the stone away with them. If it is fortunate, it falls upon suitable ground and begins to grow, or to germinate, as we say. The living interior of the stone, which contains the seed of the young plant, begins to grow and passes through the shell, and so a new tree begins to form. It was for this that the flowers were made.

HOW DOES STILL WATER REFLECT A DISTANT SCENE?

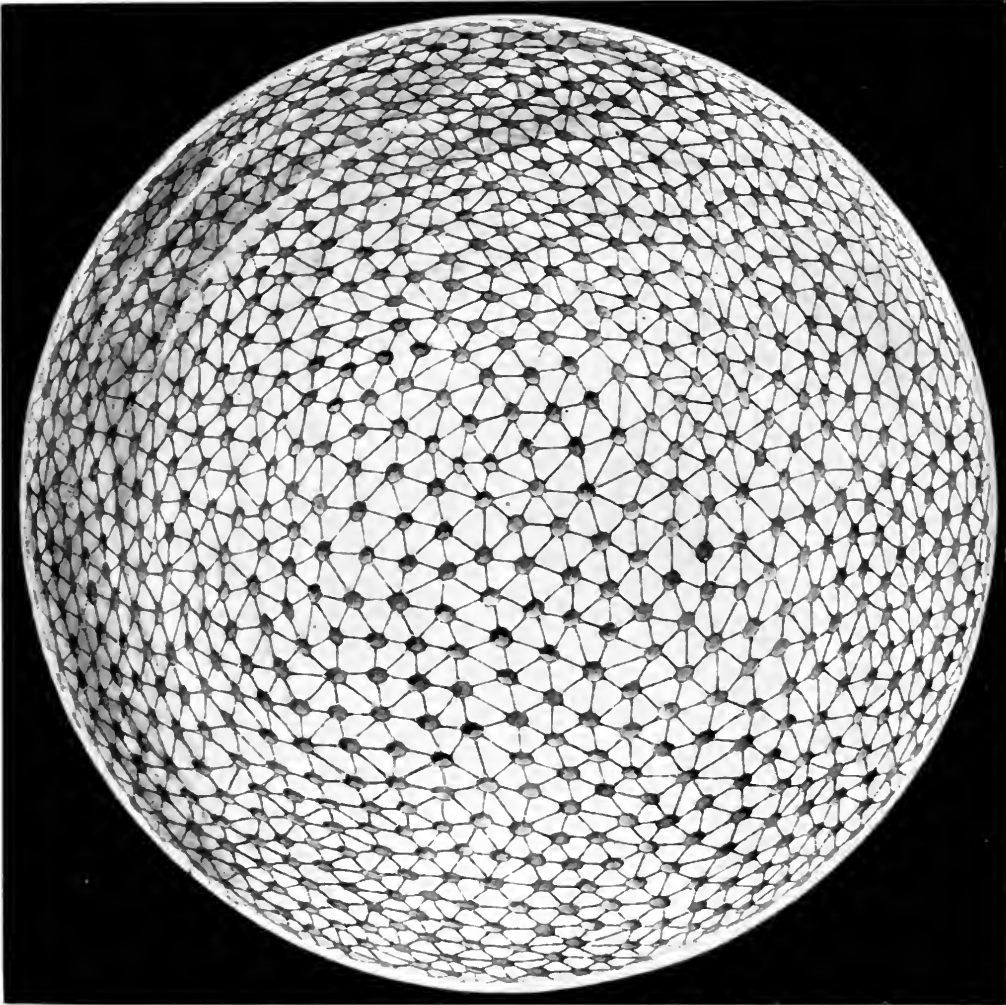
The distance from which the light comes has nothing whatever to do with what happens to it. Still water, like many other surfaces, is a very exact reflector of light. It throws the light-waves back from itself without mixing them up or distorting them. So long as it does this, we can see the image of whatever threw the light. It matters not in the least how far the light has traveled before it reached the water. We can see trees reflected in it, but we can see the stars or the sun reflected in it equally well, though they are scores of millions of miles away.

HOW DOES A SOAP BUBBLE
HOLD TOGETHER?

The tiny particles of water which make a soap bubble are held together by the force we call "surface tension."

Surface tension is a force that acts in the particles at the surfaces of fluids, and

see it, too, in the rounded form which little drops of fluids take, for this form is made by the pull, or surface tension, of the particles. On the surface of every liquid there is such an elastic skin made by the particles there hanging on to each other and pulling on each other, and producing

**THE WONDERFUL WAY IN WHICH A SOAP BUBBLE IS MADE TO HOLD TOGETHER**

This picture shows us how a soap bubble holds together. Of course no microscope could show us a bubble like this, but the picture gives us an idea of how a bubble is made. The molecules of water should really be infinitely smaller and greater in number than here, and the lines between the molecules are merely drawn to suggest the way in which the pull, or surface tension, of water draws the molecules together. There are not really any lines. See explanation on this page.

acts in such a way that each attracts each and pulls on each, and will stretch rather than separate from its neighbors. In this way the united particles come to make, as it were, a very thin elastic skin.

We see surface tension acting when we fill a tumbler of water above the brim, for the particles form a rounded skin which prevents the water from overflowing. We

such a condition of tightness or tension as we find in stretched elastic. A bubble is all surface: it is simply such an elastic surface skin stretched by air pressure. As the air pressure presses equally in all directions, and the particles pull equally on each other, the skin is blown up into a round balloon just as any other elastic skin might be. But the bubble must

burst in time, for the particles which hang together and compose its skin are subject, like other particles, to the action of gravitation. They are not only stretched by the air inside the bubble, but are pulled downward by the force of gravity, and that force is greater than the other force called surface tension. So some drops run down the bubble, and the bubble becomes thinned and weakened in parts, and in the end so thin and weak that it cannot resist the pressure of the air inside it, and accordingly bursts.

WHAT MAKES A SOAP BUBBLE RISE AND FALL?

If a soap bubble lasts long enough, and does not burst too soon, it will begin to come down again after a little.

The simplest explanation of this would be to remember the case of a balloon filled with hot air. It goes up for a time, and then it comes down again. It goes up because the hot air inside it is lighter than the air round it, and, being lighter, must rise, just as hydrogen would have to rise.

When it cools, the weight of the covering of the balloon brings it down again. Now, a soap bubble is really a little hot-air balloon, for the air that fills it is warm air from our lungs, and the air is so much lighter than the air outside that it goes up with force enough to carry the weight of the water that makes the skin of the soap bubble.

But this cannot last long, for the skin of a soap bubble is very thin, and so the heat from our breath that is inside the soap bubble soon escapes, and the bubble becomes as cool as the air around it. Then there is nothing to hold up the water of the bubble, and it begins to come down. It is interesting to know that the early experiments for ballooning were actually made with soap bubbles.

WHY DO WE HEAR BETTER ON WATER THAN ON LAND?

Sound is composed of waves of different lengths transmitted through the air, and these waves can be interrupted and broken up by coming in contact with any obstacle, as the waves of water are broken up when they strike a rock.

On the land sound-waves cannot travel far without striking against houses, or trees, or mountains, or other obstacles to their progress, and these prevent the sound traveling to a great distance. On the sea, however, or on a great lake where the surface is perfectly level, it is possible

to hear for a very long distance, simply because there is no hindrance to the path taken by the sound.

WHY DOES A MATCH GO OUT WHEN WE BLOW IT?

When a match or a fire burns, it makes a certain amount of heat. Now, it needs heat in order that it may burn at all, and that is why we have to put a match to a fire. Once it has started burning it will keep itself hot enough to go on burning as long as there is stuff to burn and air to burn it with.

Now, we can blow a match out because we blow away the heat in the hot gases which are just going to burn, and the whole thing becomes so cold that it will burn no longer, any more than the match would before it was struck. Any fire the heat of which is in the gases it makes can be blown out in the same way if we have a big enough wind to do it. You must have seen the wind blow out a fire at a picnic. But the wind cannot blow out a coal-fire, because much of the heat which keeps the fire going is in the glowing coal itself, and the wind cannot blow that away. We can make a match burn more quickly by blowing on it gently enough, so as not to blow its heat away altogether but so as to keep up a brisker supply of air than if we were not blowing at all.

CAN TREES RECEIVE A WIRELESS MESSAGE?

Lord Tennyson, in one of his best-known poems, imagines an oak talking. This may seem a mere poet's flight of fancy, but something very much like it is happening to-day. An American engineer, General Squier, discovered that trees pick up wireless waves, and can in their turn be tapped so that the trees in our garden and the giants of the forest and the pines of the mountain are all like an army of spies listening for the messages of men, and then giving up the stolen messages.

The discoverer drove a nail into a tree high up on the trunk, and then joined the nail to an ordinary wireless receiving-instrument by means of a piece of wire. At once he received a stream of messages from ships at sea and from stations as far away as a thousand miles. People with a tall tree in their garden may thus be able to listen to the time signals sent out from Washington; and travelers and explorers on the march may be able merely to drive a nail into any handy tree in order to receive news from the outer

world. This use of tall trees as receiving-stations for wireless messages will greatly simplify the use of wireless in wild, remote countries.

WHAT DO WE MEAN BY TRADITION?

When knowledge of any kind is handed down from father to son, we say that it is tradition, which means "giving across." Tradition may be given across by word of mouth, or, in later stages of civilization, is passed on by means of books.

It is one of the most unfortunate things in the history of the world that tradition so often gets lost, as in the case of the pyramids, for instance. Probably tradition was quite safe so long as a particular civilization endured, but it was always endangered by conquest. Many things were destroyed when cities were captured, and so traditional knowledge was lost.

WHY DOES AN OWL COME OUT BY NIGHT?

Quite a number of animals, and some other birds besides owls, are *nocturnal* in their habits; that is to say, they are adapted for living their lives generally during the hours of night.

If we want to understand why an animal comes out at night, or why it comes out in the daytime, we must, as a rule, ask ourselves, What is it that makes an animal active at one time of the day rather than at another? The answer to this question is generally to be found in the search for food. So it is in the case of the owls. Owls feed chiefly upon mice and other small creatures that are active during the hours of the night, and so the owl, with its peculiar noiseless flight, due to the fact that its plumage is so soft, comes out at night in search of food. It is because of this habit that the pupils of the owl's eyes are adapted for seeing at night. They are made to open very widely to catch every ray of light that there may be.

WHY DOES A WET PLATE GET DRY IF WE LEAVE IT ALONE?

This is due simply to what we call the evaporation of water, and the great fact about this is that it occurs at all temperatures. It is true that on a hot day, or when put before a fire, a plate may get dry much more quickly than otherwise, but water everywhere evaporates at all temperatures, though the rate varies according to the amount of water already present in the atmosphere.

Sometimes, whatever the temperature, we may find that the wet plate does not get dry when we leave it, and even that dry things get damp. Matches will not strike, we find, and writing-paper is quite moist. In such cases the air has been holding more water than it needed, and has deposited it on everything exposed to it. That is what happens when a wet plate laid on the grass becomes wetter.

WHERE DOES THE FOG GO WHEN IT CLEARS UP SUDDENLY?

The answer to this question is not fully understood, but we know quite well what happens in certain cases. For instance, a wind, warm or cold, may come in and drive the fog before it, exactly as the air of a room where several people have been smoking may be cleared by making a draft. Or sometimes a fog clears suddenly because the air gets warmer, as may happen in various ways. A fog is possible only when the air is below a certain temperature, and if the sun, coming through clouds, or an inrush of warm air, raises the temperature above this point, the fog will suddenly disappear.

But electricity is also concerned in this question. We know that it is possible to disperse a fog artificially with great speed by means of electricity; this has been proved by Sir Oliver Lodge. Now, electrical changes constantly occur in the atmosphere. Indeed, we are beginning to learn that they are the principal causes of the weather; and it is very likely that sometimes when a fog suddenly disappears, as if by magic, it is because of some electrical change in the air, of the same kind as that produced by Sir Oliver Lodge's machine for dispersing fogs.

WHAT IS A CENOTAPH?

Cenotaph is an English word made up of two Greek words meaning "empty tomb," and that is exactly what a cenotaph is. It is a monument erected in honor of some dead person or persons buried elsewhere. Before the armistice which followed the World War the word was little used, except in learned books and by scholars; but since that time it has become a very familiar word, and all boys and girls should know what it means.

Cenotaphs to commemorate our soldiers have been erected in many towns and cities. These empty tombs are almost as old as architecture itself.

THE NEXT WONDER QUESTIONS ARE ON PAGE 1113.

TWO SCENES FROM SHAKESPEARE'S PLAYS



In *Measure for Measure*, Angelo, ruling for the Duke of Vienna, condemns Claudio to death. Just before Claudio's sister Isabella had entered a convent, but she came and interceded for her brother. The Lord Deputy consented to pardon Claudio if Isabella would wed him—which she shrank from doing. The tangle is set right by the real Duke of Vienna, who, disguised as a monk, has overheard everything.



King Polixenes of Bohemia had been visiting his old friend King Leontes, who became jealous of him and his own wife Hermione. Polixenes returned to his own country, but Hermione was persecuted by her husband and forced to put away her little daughter Perdita, who was rescued in the desert and brought up by a shepherd. Florizel, son of Polixenes, fell in love with and married the shepherdess.



Shylock and the merchants on the bridge in Venice.—From the painting by Sir John Gilbert.

SHAKESPEARE AT HIS HEIGHT

NO one has ever explained satisfactorily why it was that between the years 1600 and 1608—or his thirty-sixth and forty-fourth year—Shakespeare's outlook on life became so serious. In those years his mind grew deeper, broader and more sombre, and he gathered into his character the qualities that made him supremely great.

He had been a bright and masterly poet, a fervent patriot, a wonderful observer and painter of life, a delightful humorist, a happy trickster with playful fancy, but now he became a deep student of the passions that move men to do such deeds as stir our hearts to mingled admiration, horror and pity. All his greatest tragedies belong to this stern and lofty period, and his style of writing changed, growing in beauty and power as it had to express deeper feeling and more exalted thought.

Julius Cæsar, Hamlet, Othello, Macbeth, King Lear, and Antony and Cleopatra were all written at this time, and they carry English drama to its high-water mark. In these plays Shakespeare pictures men striving like demigods with fate, a prey to ambitions, weaknesses, self-deception; overthrown, yet remaining noble in their fall.

The Roman plays were taken, with frank quotations, quite openly, from

Plutarch's Lives, and the British plays (Macbeth and Lear) from Holin-

shed's Chronicles; for Shakespeare took his materials from wherever he could find them, tales of all kinds being at that

time common property. But he transformed whatever he took; he built up the old materials into a noble structure gloriously new.

Julius Cæsar (in which Brutus is the hero, and not Cæsar, though he is a regal figure) shows how honest manliness may by craftiness be worked on and warped till it is led into deeds that it would naturally hate. The play is the story of a plot to mislead the upright Brutus into throwing the cloak of his honesty over a group of conspirators. The plot works, but it ends in disaster, and all the conspirators are its victims, as Cæsar was their victim.

Cæsar himself, far more clear-sighted than Brutus, sums up the conspirators as they really are; but Brutus never finds them out. When, passing along the street, Cæsar gives a single glance at Cassius, the arch-conspirator, he says to his friend Antony:

Let me have men about me that are fat;
Sleek-headed men, and such as sleep
o' nights.

Yon Cassius has a lean and hungry look;

He thinks too much; such men are dangerous.

ANTONY: Fear him not, Cæsar, he's not dangerous;

He is a noble Roman, and well given.

CÆSAR: Would he were fatter! But I fear him not;

Yet if my name were liable to fear,
I do not know the man I should avoid
So soon as that spare Cassius. He reads much;

He is a great observer, and he looks
Quite through the deeds of men; he loves no plays.

As thou dost, Antony; he hears no music;
Seldom he smiles; and smiles in such a sort
As if he mocked himself, and scorned his spirit,

That could be moved to smile at anything.
Such men as he be never at heart's ease,
While they behold a greater than themselves,
And therefore are they very dangerous.

There we watch Cæsar, the man of the world, reading character through and through at a glance, while plain, honest Brutus has scarcely a glimmer of suspicion. Indeed, right at the end of the play, when Cæsar is dead, the plot has actually failed, and Brutus, himself a fugitive, deceived, defeated, hopeless, is about to die, he still is blind to the deception practiced on him, and holds all men as honest as himself.

Farewell to you—and you—and you, Volumnius;

Strato, thou hast been all this while asleep—
Farewell to thee too, Strato. Countrymen,
*My heart doth joy that yet, in all my life,
I found no man but he was true to me.*

After that supreme, though fondly simple, trust in other men, well might Mark Antony say of the noble Brutus:

This was the noblest Roman of them all.
All the conspirators save only he
Did that they did in envy of great Cæsar;
He only in a general honest thought
And common good to all made one of them.
His life was gentle; and the elements
So mixed in him that Nature might stand up
And say to all the world, "This was a man!"

The contrast between plain but blundering honesty and the subtle skill of quicker minds is made with amazing delicacy and power in the speeches of Brutus and Antony to the Roman mob after the murder of Cæsar. Then Antony, gradually, little by little and step by step, turns the Roman populace from a desire to give Brutus "a statue with his ancestors," to a frenzied wish to burn his house and tear him to pieces.

It is in scenes like this that Shakespeare's new power of making the dead

live, with all their passions and weakness aflame, is expressed as a reality that startles us when we first see or read it, and yet never fades from our memory.

Hamlet, by far the most frequently played of all the classical tragedies, is a study of the irresolute mind.

The reflective tone of the play has caused it to be more quoted, in brief sayings, than any other, to the almost infinite enrichment of English speech. This being so, it is fitting that a speech should be included in the play that is made up of good advice, and that Polonius, who has reached the period of talkative old age, should be the speaker, and should unload his wisdom on his son in the form of a "few precepts." They may be called the commandments of the worldly-wise.

Give thy thoughts no tongue,
Nor any unproportioned thought his act.
Be thou familiar but by no means vulgar.
The friends thou hast, and their adoption tried,
Grapple them to thy soul with hoops of steel;
But do not dull thy palm with entertainment
Of each new hatched unpledged comrade.
Beware

Of entrance to a quarrel; but, being in,
Bear it that the opposed may beware of thee.
Give every man thine ear, but few thy voice,
Take each man's censure, but reserve thy judgment.

Costly thy habit as thy purse can buy,
But not expressed in fancy; rich not gaudy;
For the apparel oft proclaims the man,
And they in France of the best rank and station

Are most select and generous, chief in that.
Neither a borrower nor a lender be;
For loan oft loseth both itself and friend,
And borrowing dulls the edge of husbandry.
This above all—To thine own self be true,
And it must follow, as the night the day,
Thou canst not then be false to any man.

In Othello Shakespeare traced the effects of jealousy acting on a noble but impetuous Oriental nature. The character of Iago seems to be an attempt to paint the complete villain without a redeeming quality, the careless Cassio and simple Othello acting as foils to show up the picture.

There is no greater triumph of literary skill in the world's books than the way in which Shakespeare keeps the sympathy of the reader or the playgoer with Othello, even when he is putting out the light of life in Desdemona, the most purely beautiful of all the women whom the great poet created. We are made to feel that this is no vulgar violence, but a high defense of the sweet cause of purity.

In Othello pathos is carried to an intensity perhaps only once again touched in our literature. It broods over the play. We feel its beginnings when Othello is called upon to defend before the "potent, grave and reverend signiors" of Venice his love for Desdemona and her love for him. Though he is successful, there is a feeling that an unkindly fate is impending; and that his later exclamation, "If it were now to die 'twere now to be most happy," will come true. Yet all the pitifulness of the play is a noble sensation, upholding the ancient idea of the purifying power of pity. The deep feeling of it all surges up in Othello's speech before he, as he thinks, executes justice on Desdemona:

It is the cause, it is the cause, my soul!
Let me not name it to you, you chaste stars!
It is the cause! Yet I'll not shed her blood,
Nor scar that whiter skin of hers than snow,
And smooth as monumental alabaster.
Yet she must die, else she'll betray more men.
Put out the light; and then put out the light.
If I quench thee, thou flaming minister,
I can again thy former light restore
Should I repent me; but once put out thy
light,

Thou cunning'st pattern of excelling nature,
I know not where is that Promethean heat
That can thy light relume. When I have
plucked the rose
I cannot give it vital growth again.

Othello is the best example of how tragedy may be terrible without being brutal or vulgar. Incidentally it gives, in Cassio, the most effective stage picture of waste of life and character through drink.

In Macbeth Shakespeare makes his fullest use of witchcraft. It was a very powerful thing to do in the days when witchcraft was firmly believed in, even by intelligent people; and to-day his ghosts and witches are very real. He used omens in Cæsar, a stately ghost in Hamlet, apparitions in Richard the Third, and all these devices in Macbeth. His lighter plays, like *A Midsummer Night's Dream* and *The Tempest*, are steeped in fanciful magic. The witches, or weird sisters, meet us in the opening scene of Macbeth, and the veil between the real and supernatural worlds is thin throughout the play. Yet the supernatural is always secondary. It does not control the fates of men: it only foreshadows, accompanies and assists. The limits of its power are clearly drawn by one of the witches in Macbeth, who is pursuing a seafarer with her spite:

Though his bark *cannot be lost*,
Yet it shall be tempest-tossed.

Macbeth shows the ruining effect of ambition, both on stronger and weaker natures, when it becomes a mastering passion. No play by Shakespeare is cast in a more fanciful form.

The tainted but hesitating Macbeth, and the masterful Lady Macbeth, are at last equally weakened and broken up by their treacherous sin, the murder of their king while he was their guest. Then the life which seemed glorious to them, as king and queen in the murdered Duncan's stead, is so empty that it is summed up in Macbeth's words of terrible hopelessness:

Tomorrow, and tomorrow, and tomorrow,
Creeps in this petty pace from day to day,
To the last syllable of recorded time;
And all our yesterdays have lighted fools
The way to dusty death. Out, out, brief
candle!

Life's but a walking shadow, a poor player
That struts and frets his hour upon the stage
And then is heard no more. It is a tale
Told by an idiot, full of sound and fury,
Signifying nothing.

When read as the despairing words of a disillusioned bad man, all this is profoundly moral—as all Shakespeare's plays are if they are rightly understood.

King Lear is the play that competes with Othello in force and pathos. It is a study of ingratitude, so agonizingly pitiful that many think it can never be acted perfectly; it would be too full of anguish to do and to see. Whether it has been acted perfectly cannot well be decided, for acting cannot be handed down. We can judge it only by the records left by our fathers, whose tastes may not have been like our own. Every one of us must agree with the touching words of Lear's faithful friend Kent, as Lear is dying:

Vex not his ghost! O! let him pass; he
hates him
That would upon the rack of this rough
world
Stretch him out longer.

Here we have but glanced for a moment at a few of the mighty tragedies that have placed Shakespeare on a pedestal apart as the supreme poet of the modern world. But the great period of his life when Shakespeare wrote of

exultations, agonies,
And love, and man's unconquerable mind,
passed away, and in his later years he sailed his bark into quieter waters, and approached his end in a calm spirit.

The three plays which best illustrate this period of Shakespeare's quiet even-tide, when he had become a wealthy man, as wealth was then counted, and probably lived mostly in retirement at his native Stratford, are *Cymbeline*, *The Winter's Tale* and *The Tempest*. The tone of all three is peaceful, and the endings tell of peace-making and forgiveness. It is no mere fancy that Shakespeare was looking forward to his final rest, and perhaps even foresaw something of his own fame. The feeling expressed in the song in *Cymbeline* is echoed more faintly again and again.

Fear no more the heat o' the sun,
Nor the furious winter's rages;
Thou thy worldly task hast done,
Home art gone, and ta'en thy wages.

Fear no more the frown of the great,
Thou art past the tyrant's stroke;
Care no more to clothe and eat;
To thee the reed is as the oak.

Fear no more the lightning flash,
Nor the all-dreaded thunder-stone;
Fear not slander, censure rash;
Thou hast finished joy and moan.

Quiet consummation have;
And renowned be thy grave.

But the most remarkable of Shakespeare's later plays is *The Tempest*, which may be accepted as his deliberate farewell to the stage, though probably he could not stand entirely aloof, even though he had pictured himself as the magician giving up his wand.

HOW SHAKESPEARE PASSED TO HIS EVERLASTING FAME

Into this play he poured afresh samples of the kinds of verse in which he had taken his dearest early delight. He creates new sprites, after the fashion of Puck in *A Midsummer Night's Dream*, to sing new dainty songs, such as Ariel's seaside air:

Come unto these yellow sands,
And then take hands;
Curtied when you have and kissed
The wild waves whist,
Foot it feathery here and there,
And, sweet sprites, the burden bear.

The last line is an invitation to the sprites to join in the chorus. Or, again, there is the companion song, to lure the shipwrecked Ferdinand to the place where he will meet the fair Miranda.

Full fathom five thy father lies;
Of his bones are coral made;

Those are pearls that were his eyes;
Nothing of him that doth fade
But doth suffer a sea change
Into something rich and strange.
Sea nymphs hourly ring his knell.
Hark! Now I hear them—ding-dong bell.

What exultant merriment there is in the song of Ariel when he has been promised freedom by the enchanter Prospero, who is giving up his magic powers.

Where the bee sucks there suck I;
In the cowslip's bell I lie;
There I couch when owls do cry.
On the bat's back I do fly
After summer merrily.
Merrily, merrily, shall I live now
Under the blossom that hangs on the bough.

The graver passages of sublime thought that were never very far away from Shakespeare's pen are again brought into his closing play, as when, having entertained Ferdinand, the shipwrecked prince, with some magic visions, he brings down the curtain with the words:

Our revels now are ended. These our actors,
As I foretold you, were all spirits and
Are melted into air, into thin air;
And, like the baseless fabric of this vision,
The cloud-capped towers, the gorgeous pal-
aces,

The solemn temples, the great globe itself,
Yea, all which it inherit, shall dissolve
And, like this insubstantial pageant faded,
Leave not a rack behind. We are such stuff
As dreams are made on, and our little life
Is rounded with a sleep.

Perhaps most striking is the Epilogue that ends the play. After Prospero has renounced his "so potent art," as Shakespeare was renouncing his, and has determined to break his magic staff and "bury it certain fathoms in the earth," he tells his hearers, now his charms are all overthrown, what his aim has been. It was *to please*. And he marks the ending of his project by the confession:

Now I want
Spirits to enforce, art to enchant,
And my ending is despair
Unless I be relieved by prayer,
Which pierces so that it assaults
Mercy itself, and frees all faults.

We refuse to give up the fancy that that is how "the gentle Shakespeare," as his contemporaries called him, once a poor player who strutted and fretted his hour upon the stage, and then the most sweet and gracious as well as solemn and powerful of all poets, made his adieu to his audiences and his readers, and passed on to everlasting fame.

THE NEXT STORY OF LITERATURE IS ON PAGE 1117.

SCENES FROM SHAKESPEARE'S PLAYS



MALVOLIO AND THE COUNTESS IN TWELFTH NIGHT—From the painting by Daniel Maclise.



KING LEAR RENOUNCES HIS DAUGHTER CORDELIA IN FAVOR OF HER SISTERS
From the painting by Ford Madox Brown.

SCENES FROM SHAKESPEARE'S PLAYS



Oberon, having quarreled with Titania, caused Puck to drop some magic juice into her eyes, so that when she awoke she would love the first thing she saw. Bottom, a weaver, whose head had been changed into that of an ass, was the first creature Titania saw, and she fell in love with him. A ridiculous interlude follows in which the dainty little fairy Queen lavishes endearments and caresses upon the ungainly mechanic. She causes her attendants to pay him every attention, and herself listens entranced when the weaver disturbs the forest silence with his raucous voice and stupid song. Meanwhile Bottom's companions, believing him bewitched—as indeed he was—have fled back to the city. When Oberon, taking pity upon his queen, has released her from the spell, she exclaims in amazement, "Methought I was enamour'd of an ass."



Petruchio was a gentleman who undertook to "tame" Katharina, a very hot-tempered lady whom he married. His plan was to pretend he was always in a temper. He dressed absurdly, and when proper clothes were brought in he threw them on the floor and behaved so badly that at last Katharina saw it was best to obey her husband. His plan succeeded, as we learn in *The Taming of the Shrew*.

The Book of MEN AND WOMEN

WHAT THIS STORY TELLS US

NOW that men have conquered darkness, so that we can fill a place with light by turning a tap, it is hard to imagine what it must have been like to live before men found out how to make light. To-day a child can fill a dark room with light by touching a switch or turning a tap; but even a king could not have done that a hundred years ago. The men who began to light the world with gas were laughed at as if they were idle dreamers, and even wise men declared that lighting houses and towns by gas was a mad idea. But the men plodded on, as all the inventors did, fighting against ignorance and superstition, and they won the day. It is one of the most hopeful signs in the world when the world laughs at you, and we can never pay the debt we owe to the men who struggled hard to benefit the world while those who looked on laughed.

THE MEN WHO GAVE US LIGHT

"If you please, will you give me some fire?"

What would you think if somebody came to the door and said that? It would sound strange indeed to you; but your forefathers must have heard it often. Think of a place in which gas is not used, where there is no electric light, where there are no matches, then you will have an idea of what things were like when some of your great-grandfathers were little boys. Then the servant had to burn old rag overnight to make tinder for the morning; and, before it was light, she would have to get up and strike a piece of iron on a piece of flint and make sparks fly from it, to set light to the tinder, so that something else could be lighted from it. If the tinder were damp or the flint old, then there was nothing for it but to go and borrow some fire from a neighbor's hearth.

How do you think we first got fire and light? Nobody really knows; but it is supposed that men, ages and ages ago, first found that sticks would burn if dropped into some hole where melted lava from a volcano lay boiling. Or they may have seen trees catch fire through being struck by lightning. Men learned that by rubbing two pieces of wood together they could cause them to catch fire, and for thousands of years that was the way in which they set light to their wood.

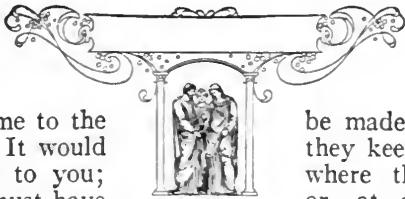
Savages in many parts of the world still do this; but, as wet wood cannot

be made to light in this way, they keep fires always burning where the forests are damp, or, at any rate, during the rainy season. Striking fire from flint came a very long time after the rubbing of wood, for during thousands of years men did not know how to obtain and how to use iron.

When they got used to making fires with which to cook their food and to keep themselves warm at night, they found that certain resins or gums from trees would burn with a bright flame and last longer than wood alone. So they would melt the resin and dip twigs into it, and so make torches, which would serve to light their homes at night. This sort of light had to serve for ages. In fact, the iron stands in which torches used to be fixed are still to be seen in old houses.

We had no gas in American streets, nor, indeed, in any streets in the world, when the nineteenth century came in. Boys ran about the towns at night carrying torches, or links, as they were called, and if you wanted to go to a friend's house after daylight had gone you had to hire a link-boy to light the way, or else risk losing your life.

Napoleon and Washington never saw a gas-lamp. In their day the



best lights were candles and miserable little oil-lamps, such as men had had for hundreds of years before. When you read about the past splendors and marvels of the palaces of the East, or of the luxury and delight of the great baronial halls of England, you must remember that these places were gloomy and murky at night, with their smoky lamps and dim candles or torches. When you read of the great speeches made by Patrick Henry or Daniel Webster, you must remember that, if those speeches were made after dark, the buildings in which they were made had to be lighted up by candles. When King William IV was making a speech to the House of Commons, he had to stop because it was too dark for him to read, and he waited until candles were brought in.

Yet there was gas to be had then, as there is now, if men had but known how to get it.

A GREAT BLAZE OF LIGHT THAT SET A CLEVER MAN THINKING

In a coal-mine at Whitehaven, gas used to escape from the coal into the pit. This gas, catching fire, produced a flame a yard wide and two yards long. The gas kept escaping, so the flame continued to burn, and the miners did not know how to put it out. What they did was to build up brickwork round the flame, then put in a metal tube which they carried to the top of the pit. The gas rushed through this tube and burned high in the air over the mouth of the mine; and there it burned for a long time, and at night lighted up the country around.

The story of this was printed in 1733, and it set a clever man, called Dr. Clayton, thinking; for in 1737 he began to try experiments with coal-gas. He did not quite know what it was, so he called it "the spirit of coal." He used to burn coal in a retort and catch the gas in bladders. Then, to amuse his friends, he would prick a hole in the bladder, and putting the hole near a lighted candle, would startle everybody by letting the gas blaze away until none of it was left. Dr. Clayton had really gone so far toward making coal-gas that he ought to have gone further and made a success of his invention; but he did not know how great a discovery he had made, and

nothing serious was done with gas for over fifty years.

One day, in 1777, a young Scotsman walked into the office of Messrs. Boulton and Watt, the steam-engine makers of Soho, Birmingham, and asked for work. He was so nervous when answering Mr. Boulton's questions that he let his hat drop to the ground. The hat made such a noise on touching the floor that Mr. Boulton was surprised, and asked the reason. The young man explained that the hat was a wooden one, which he himself had made on his father's lathe. Mr. Boulton thought that anyone who could do this was no ordinary man, and forthwith engaged him.

THE YOUNG SCOTSMAN WITH A WOODEN HAT, WHO INVENTED GAS-LIGHT

That young man was William Murdock, the inventor of coal-gas. His name really was "Murdoch," but as English people could not pronounce the name in the Scottish way he changed it to Murdock, so that it should be spelled as they pronounced it. He was born in 1754 at Old Cumnock, Ayrshire, and is the same William Murdock of whom you read in the story of the Men Who Made the Railways, on page 1611.

Murdock proved a very clever man. He had a wonderful brain, and was always inventing things, some of which were of much importance. But he was so modest that he never cared for these things for his own sake; he wished his employers to get the credit for what he did, and his fellow-men to enjoy the benefit. As Murdock was so good a workman, Boulton and Watt sent him into Cornwall, where they built engines. He lived in a cottage at Redruth.

HOW THE GAS-MAN FRIGHTENED THE VILLAGE BY NIGHT

Here it was that he made his model steam locomotive. He had an amusing adventure with it. He set it going on the road late one night, without having tried it before, except in his own room. When the little engine got up steam, it raced away from its maker. Murdock had had no idea that it would go so fast. It soon disappeared, and he heard cries of terror in the distance. Murdock ran as fast as he could, and found that the cries came from the lips of the village clergyman, who, seeing the little engine hissing and aglow with fire, had taken it to be some terrible monster.

THE BOYHOOD OF SIR HUMPHRY DAVY



YOUNG HUMPHRY DAVY MAKING HIS FIRST EXPERIMENTS

Now, the making of gas filled Murdock's mind. Other people knew that it existed, but he was the first man to think out what could be done with it. He made all sorts of trials in secret at his little house, and the boys of Redruth, who knew that this quiet Scotsman was very clever, used to creep softly about outside his house, badly wanting to look in to see what he was doing.

THE BOY WHO BOUGHT A THIMBLE AND SAW IT LIGHTED WITH GAS

It is said that one day Murdock came out and saw several of the boys standing there. He called one, William Symonds, and sent him to the shop near by for a thimble. William ran there and back, but he wanted to go into the house to see what that thimble was for. So when he got to the door he pretended to be fumbling for the thimble.

Murdock let him go into the house to find it, and then closed the door behind him. Murdock had a kettle filled with coal; he had burned the coal and caused the gas to be driven into a large metal case, such as they used for blasting. In this he had fixed a metal tube. On the end of this he now fastened the thimble, in which he first made one or two small holes. Then he let the gas escape through tube and thimble, and set light to it. Of course, the gas blazed merrily, and so young William Symonds saw the discoverer of the use of coal-gas make an interesting experiment.

After this, Murdock used to fill a bladder with gas, fix a metal tube in the neck, light the gas which came through it, and use it as a lantern to light him about at nights. You will not be surprised to hear that the simple people of Redruth thought he was a wizard.

THE LITTLE COTTAGE IN CORNWALL WHICH WAS FIRST LIGHTED BY GAS

There is some doubt when the first house was lighted by gas. In 1892 a great many people celebrated what they believed to be the hundredth anniversary of gas-lighting; but they seem to have been wrong in their date, for the year was probably either 1794 or 1795. In one of those years—it does not matter very much which—Murdock is said to have made enough gas to light his house. The gas was made in his little garden, then carried by a pipe through a hole made in the window-frame to a position near the ceiling. So the Scotsman's cot-

tage, far away in a Cornish village, was the first house lighted by gas.

When he had succeeded here, Murdock fitted up pipes and made gas and lighted his employers' premises at Soho. That was in 1802, when the whole place was made bright to show how glad everybody was that the war between England and France had come to an end.

People did not know what this gas-light was. A retort containing the gas was placed in the fireplace; a pipe ran to the outside of the workshop, and there the gas blazed in two copper vases. That was the first public display of gas-lighting, and people thought it was only some new sort of fireworks.

Murdock's employers were so pleased with the light that in 1803 they had part of their factory at Soho lighted with gas, and after that other people, seeing how bright it was, how much cleaner and cheaper than lamps and candles, wanted to have their premises lighted in the same way. A Manchester cotton-mill was the next to be lighted with gas, and Murdock fitted up the pipes and burners and had them burning by New Year's Day, 1806.

THE MAN WHO MADE THE GAS-LIGHT AND THE MEN WHO MADE THE MONEY

Up to the time when he lighted up his own house with gas, Murdock was paid \$5 a week. When he was called back to Soho, the mine-owners of Cornwall begged him not to go, saying, "We will give you \$100 a week to stay." But Murdock was too faithful a servant to heed this. He went to Soho, and in the end he had a salary there similar to that which his admirers in Cornwall had offered him. But in all his life he never made any money out of gas-lighting.

Gas-lighting was taken up by a German in London named Winsor. This man wanted Parliament to make everybody in the country burn gas, and to give the company which he was forming the right to make the gas and fit up all the streets and houses with pipes and burners. The profits would be so great, he said, that he would be able to give the State great sums, and make all who lent him money for the beginning of the work very rich indeed. He failed then to get the consent of Parliament, but in 1810 a company was formed which began the lighting of London by gas.

It was not at first successful. People did not believe in gas. Sir Humphry Davy, a very great man, did not believe in it. "To get all the gas you want you will need the dome of St. Paul's Cathedral for a gas-holder, and that will explode," he said. Sir Walter Scott said, "There is a madman in London proposing to light London with—what do you think?—*smoke!*" He did not understand it any better than the most ignorant of men; yet, in later years, he had gas-pipes fitted up at his own house, and found what a splendid thing it was. Winsor did good work by persevering till he got the first company formed.

HOW THE GREAT GAS MYSTERY PUZZLED THE PEOPLE IN THE STREETS

In 1813 Westminster Bridge was lighted up by gas. How the people wondered! They thought that the flame which they saw came through the pipes. They could not understand that the gas came through the pipes, and was lighted at the burner; they imagined that there was a roaring flame inside the pipes, and that the lamp-lighters simply turned a tap and let out the flame.

When at last gas was introduced into the House of Commons, people thought the pipes would be so hot that they would burn the building, so they had the pipes fixed far away from the walls, lest the building should be set on fire. Members of Parliament used to put on their gloves to escape being burned, then go and feel the pipes, to see if they were hot. They could hardly believe their senses when they found that the pipes were cold.

THE GREAT IMPROVEMENT THAT HAS TAKEN PLACE IN GAS-LIGHT

The first American to light his house by gas was David Mellville, of Newport, Rhode Island. Baltimore was lighted in 1817, and Glasgow the same year; Liverpool and Dublin in 1818, and other towns, big and little, soon followed. Murdock made no profit out of it, but the honor of the discovery was his, and he was satisfied. He made as much money as he wanted at other work, and was quite well off. He will always be honored as one of the best and cleverest of men, as modest as he was skillful.

Since that time gas-lighting has greatly improved. All sorts of burners have been invented to make the light better.

The most important improvement is the incandescent light, produced by using a "mantle" that increases the light-giving power of the gas. When the gas is lighted, the mantle becomes a brilliant white and glows with a light as strong as that from the flames of 300 candles all burning at the same time. Auer von Welsbach, who first made these mantles, developed them to success.

As everybody knows, gas has a strong rival in the electric light. A few years ago, until incandescent gas became general, it seemed as if the electric light would do away with gas. Many men have helped to bring the electric light to its present state of usefulness, and many more will help before it attains perfection. We owe the discovery of it to Sir Humphry Davy.

THE CHEMIST'S APPRENTICE WHO MADE THE FIRST ELECTRIC LIGHT

Born at Penzance in 1778, he was only a poor apprentice to a little country chemist when he began his career; but he was so clever, and studied so hard, that he became the most eminent scientist of his day. It was when he was already famous that he began his experiments in electricity.

He had a great electric battery, to which he joined two wires. When their ends touched each other, nothing happened; but when the two ends were drawn just a tiny way apart, a light appeared. But it was so hot that it burned the wires, so Davy fastened two pieces of charcoal on the ends, and thus was able to make a splendid light.

What really happened was this: When the current of electricity was turned on, if the ends of the wires were together, the current ran from one to the other without a break. If the wires were separated, but held near each other, the current rushed to the end of one wire, and, on reaching the charcoal, leaped over with such force to the other piece of charcoal that it carried tiny fragments of the first piece of charcoal with it. These fragments formed a sort of bridge for the electric current from one mass of charcoal to the other. But the air resisted the passage of the current so much that the bridge of charcoal was made white hot, and so gave this brilliant light. That was the first discovery that electricity would give light, and it was made known by Davy a few

years before his death, which took place in 1829, after a long period of failing health and reduced activity.

Early electric lights were of the sort known as arc-lamps. In them, two electric wires end in pencils of carbon, which are placed in a line with each other. When the ends of the two carbons come together and then are drawn apart a little way, the current leaps in an arc from one to the other, producing a flame accompanied by intense heat. The carbon which carries the current soon gets burned away, while that which receives the current from the first does not.

**A LAMP WHICH KEEPS OUT THE AIR
THAT THE LIGHT MAY BURN BRIGHTLY**

This inequality is prevented by using alternating currents. Suppose the sticks of carbon arranged one above the other, with their points nearly meeting in the centre of the lamp. If the current is moving from the upper to the lower carbon, it can be reversed and sent from the lower to the upper. By continually changing the current we can keep the carbons burning away equally; and by treating the carbon pencils with certain salts we can vary the intensity and color of the light. A great gain has been made, too, by enclosing the carbons in a nearly air-tight vessel, for this keeps them from burning away as fast as they would in open air.

The lamps which many of our light-houses use are arc-lamps, the great, powerful lamps which send their light far and near over the sea, and warn the sailors of dangerous rocks and shoals. The light known as Barnegat light, off New Jersey, has a light which is said to equal the power of thirty million candles.

But arc-lamps are suited only for out-of-door lighting or use in some vast enclosure. There was no hope of having little lamps for the house until we could make a lamp in which there would be so little air as to be hardly noticeable—that is, a lamp with a vacuum. The first men who found a way to make the small glow-lamp were Sir Joseph Wilson Swan, a noted English electrician born in 1828, and Thomas Alva Edison, the American inventor born in 1847. Both, by their experiments, discovered what substances could or could not be used in constructing a practical electric lamp of the kind that is familiar everywhere to-day.

**THOMAS ALVA EDISON AND ELECTRIC
LAMPS FOR GENERAL USE**

The difficulty was to get some material in the lamp which would take the place of the sticks of carbon in the arc-lamp. At first a very costly metal called platinum was tried. That was all very well while it lasted, but it soon burned away, and it was too costly—few people would have been able to buy the lamp. Mr. Edison baked strips of bamboo till they became carbon, while Mr. Swan soaked threads of cotton in acid and then baked them. After much experimenting a satisfactory method was at last found. Recently lamps have been made with filaments of certain rare metals, such as tungsten, which cost more than the ordinary kind but give a brighter light. The filament which you see carrying the flame in the bulb has to be connected with wires which run through the neck of the lamp. These, in turn, are connected with the wires which carry the current to the lamp.

Now, heat causes things to expand. When the electric current enters the lamp, it causes the glass rapidly to expand. If the wires running through the neck of the lamp did not swell just as quickly, a space round them would open and let the air rush through, destroy the vacuum, and spoil the lamp. Platinum expands very rapidly under heat, so, though it is too costly to use for the filament of the lamp, it is used to join on to the filament.

**THE POOR MAN'S TREASURE WHICH ONCE
KINGS COULD NOT BUY**

While all these fittings are being put in, the glass bulb of the lamp is open at the bottom. Now the lamp is put into a wonderful machine which sucks all the air out of the lamp. The glass is made very hot and soft, and the lamp is then sealed up at the bottom. The little nob at the end of the bulb is the point at which the glass is closed up when the air has been drawn away.

All this advance has come about in a hundred years. A century ago even kings had miserable oil-lamps or dim candles to light up their homes. To-day even poor people can afford to have their homes lighted by gas or electricity if they live in a town which has gas works or an electric plant. The wall between night and day is broken down; hours of light for work and play are unlimited.

TWENTY WAYS IN WHICH WE GET LIGHT



Sun.



Moon.



Stars.



Aurora.



Lightning.



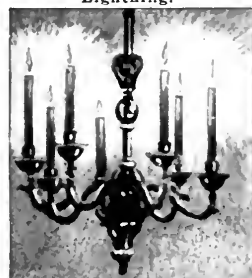
Rushlight.



Tallow Candle.



Torch.



Wax Candles.



Glow-worm.



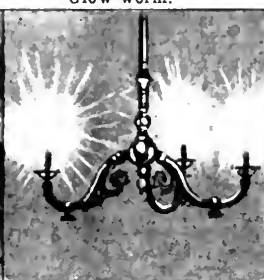
Oil-lamp.



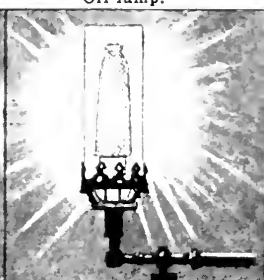
Kerosene.



Naphtha.



Gas-light.



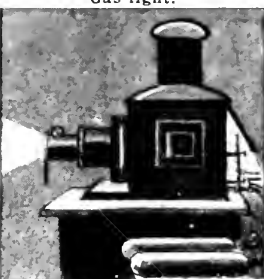
Incandescent Gas.



Electric Arc.



Incandescent Electric.



Calcium Light.



Acetylene.



Magnesium.

THE OIL-LAMP THAT LIGHTS THE COUNTRY HOME

And even though a person may live remote from towns and villages, in a spot where there is no possibility of having either gas or electricity, he need not go without good light. Very modest homes can be brightly illuminated and made cheerful by the light of such lamps as kings would have paid a ransom for in the old days.

The use of oil-lamps is such an old story that no one can tell who first thought of them. The oldest oil-lamp that has been found is at least six thousand years old. It was made from a conch shell, and was probably used to keep a light burning in an ancient temple. By and by, lamps were made of stone and later of clay, and later still of iron or bronze, but they were all merely open receptacles to hold a little oil, on which floated a rude wick, supported by a spout. After centuries had passed, men learned to cover the top of the lamp, except for the spout and a small hole through which to pour the oil, and this was an improvement, but, at their best, the lamps were only primitive affairs. The wicks were improved, however, by being specially woven, and in the eighteenth century someone thought of using a flat wick, which could be held in a burner. But even this was not satisfactory, for the air was not able to reach the middle of the thick wick, and the flame was poor and smoky.

AIMÉ ARGAND, WHO MADE THE FIRST GOOD LAMP

Hitherto men of science had not taken much interest in lamps, but in 1781 a learned Swiss named Aimé Argand turned his mind to the subject. Aimé Argand, who was born in Geneva in 1755, became a mathematician. He was much troubled by the poor light by which he had to study in the long winter evenings, and in 1781 he determined to make a lamp which should not be smoky or ill-smelling, and which would give a good, steady light. After much thought, he had a circular wick woven, which would fit over a brass cylinder in his lamp, and could be moved up and down. He allowed air to come through this cylinder from beneath, and this supplied the inside of the wick with oxygen.

His wick and cylinder worked smoothly, but with all his efforts he

could not make the flame burn brightly, until at last his young brother, who was watching him, picked up a broken flask, fitted it over the flame, and immediately the lamp gave a clear, steady light. This was the first use of a lamp chimney, and was one of the greatest discoveries ever made in lighting. Argand's lamp, which he had manufactured in England in 1782, was a great success, and paved the way for many improvements, but the inventor died in poverty in 1803. It was nearly fifty years after his death before a really good illumination could be obtained from oil, but the fault was now in the oil burned in the lamp.

THE OIL WE USE FOR FUEL IN OUR LAMPS

The oil burned in early days came from olives; the fat of animals was used; and, curiously enough, even in very ancient times people in some parts of Asia and Europe used the petroleum which they found oozing from the ground in the neighborhood of springs. In later years, sperm oil, taken from the bodies of whales, was used. This oil was early used by well-to-do people in this country, and so was colza oil, made from rape seed; and in some places lamps were made which burned lard.

In 1848 Samuel M. Kier put on sale, as illuminating oil, a stock of "carbon oil" which he could not sell as medicine; in 1846 Abraham Gesner, a Nova Scotian, began to distill oil from coal; in 1850 James Young, a Scotchman, made a good oil from shale; a year or two later Warren de la Rue invented, in England, a new process for refining mineral oil or petroleum, and in 1859 Edwin L. Drake drilled the first Pennsylvania oil well. You may read of these men in the story of How We Get Kerosene.

Soon many wells were in operation. Oil became abundant, and better means of refining it were invented. Of lamps there is now a wide choice—improved Argand lamps, student-lamps, lamps which burn brightly enough to be used as locomotive head-lights, lamps which are supplied with air by clock-work, lamps with circular wicks, lamps with large single wicks, duplex lamps with double burners, lamps on which a Welsbach mantle can be used, and the little hand-lamp of glass or metal which has been seen in every corner of the globe.

THE NEXT STORY OF MEN AND WOMEN IS ON PAGE 1243.



Fur-seals of the Arctic.

THE GREAT SEA HUNTERS

WHEN that great man and prince of naturalists, Cuvier, was chancellor of the University of Paris, his students, to whom he was as dear for his humor as for his genius, determined to play a trick on him. Their leader arrayed himself in the guise of an ox, and conducted the laughing conspirators to the professor's bedroom. They crept on tiptoe to the bedside, with a lighted candle, and woke him.

"Professor," said he of the disguise, in a hollow voice, "we have come to eat you."

Cuvier blinked for a moment, ran his eye swiftly over the figure before him, then like lightning he answered: "Eat me! Horns and hoofs! Pooh, you can't; you're graminivorous!"

The evidences which served instantly to reveal to Cuvier that a grain-eater proposed to play the impossible part of flesh-eater have their counterpart in other aspects of animal life. Its birth-right is written on every animal.

Were it not so, we might be troubled at times to decide whether certain forms are flesh or good red herring. We find the waters teeming with creatures which live and have their being in the sea. They are fish-like in their tapering outline, with fin-like flippers in place of limbs, eat the same food as the big fishes, and pass months at a

time in the sea like them.

But as we glance at them we can ignore their habits, and in the strain of Cuvier we reach our answer.

"What, air-breathing, clad with fur and charged with warm blood! You are not fishes: you are seals, sea-lions, sea-bears and walruses. You are flesh-eating land mammals, but you have made your home in the waters." That is our answer to the fish-like seals. They are simply fin-footed mammals, whose homes are in the deep, but whose ancestors lived on shore.

The group is divided by scientists into three families. These are the eared seals, the walruses and the true seals. The eared seals include the sea-lions and the fur-seals, or sea-bears.

THE SEA-LION THAT CAN CARRY A LIGHTED LAMP ON ITS NOSE

The extraordinary intelligence of these creatures has led to their becoming familiar objects to people who have never visited the sea. Every zoölogical garden has examples, and public entertainments regularly include performances by seals. How it happens that sea-lions should be masters of balancing passes understanding, but, as we all know, they can carry lighted lamps upon their noses, and by the same means balance balls and other articles with the certainty of a human

juggler whose skill is gained by many years of training.

The big sea-lion has a hairy coat. The smaller species of the eared seals are called sea-bears or fur-seals. They carry a beautiful undercoat of soft, thick fur, and are the ones most sought by hunters whose business lies with furs.

Both of these varieties have well-defined external ears, but the true seals, while their hearing is so acute that they can be lured to ship or shore by the sound of music, are without the outer conch which marks the ears of the other variety. Another distinction is that the eared seals go more to land than the true seals, which are at home, for rest or for nursery engagements, upon an ice-floe or any site which invites when absence from the water is desirable.

The sea-lion's land home is called a rookery, from the enormous numbers of animals which collect, or did collect in happier days, to rear their babies in company. The males arrive first, the females later, and as each male desires to become the lord of a harem, there are terrific battles for the opposite sex.

Rival bulls seize each other with their formidable teeth. They rip and tear till flesh is bitten away in masses, till flippers are torn to shreds, and hides reveal the greater part of their blubber lining. When the contest is ended and each has the ladies of his choice, the mothers settle down to nurse their babies, while the males stand vigilant to repel enemies.

As the female bear fasts in the snow with her babies, the male sea-lion remains foodless by his. The bull sea-lion now undergoes a fast on land which may extend to as long as four months. Four months without bite or sup! We need no longer marvel that salmon going up a river to spawn eat nothing till they return to the sea.

THE WONDERFUL LOVE OF A SEA-LION MOTHER FOR HER LITTLE ONES

The mother sea-lion, however, does feed. She goes forth to sea and swims out two hundred miles and more to secure food with which to nourish her little one. She returns to find all the pups gathered together in mobs of thousands. The young ones do not recognize their mothers. Any maternally seal with milk to yield seems a mother to them. But trust maternal love! There is something distinct for each mother in the plaintive bleating of

one little infant she knows. One voice among ten thousand is identified: it is her baby's!

"How did you find your way home?" a little girl was asked after having been lost in the streets. "I don't know how I did it: I knew there was a house with a little yellow bedstead upstairs belonging to me, so I went to it," was the child's delightful explanation.

There is the equivalent of that little yellow bedstead in a seal mother's imagination, and she goes to it without error, pushing her way through the mass of clamoring babes to her one and only love.

The southern sea-lion has its home address on the coasts of South America from Peru and Chile on the Pacific side, and from the river Plate on the Atlantic coast south to the Falkland Islands and Tierra del Fuego. It is found also at the Galapagos Islands, and was first identified by Magellan on his world voyage. Later he was seen in great size and numbers by Captain Cook.

Stellar's sea-lion, a northern species, a giant weighing more than a ton, is also associated with a memorable name. Bering, who found the waterway between Asia and America, was the first to see in it an animal previously unnamed in science.

THE TERRIBLE CRUELTY THAT FOLLOWED A HUNT FOR FUR

California gives its name to another species. New Zealand has a local variety. Australian waters are the home of a species which is specially interesting from the fact that the young have the close furry undergrowth of the fur-seal, only to lose it and turn hair-seal when they attain maturity.

As we have said, it is the sea-bears which help to clothe women who like seal-skin. The history of this animal makes us blush for humanity. Once the fur-seal was one of the most numerous of all sea animals, but the craze for its fur led to a horrible system of persecution. It was stabbed or shot at sea when its babies were starving for food on shore. On land it was butchered in tens of thousands, with every conceivable element of cruelty. Sometimes the poor creatures were skinned before life was extinct or sensation numbed. Herds numbering over two millions were reduced by this brutal and hateful system to a few score thousand, and extinction seemed in sight.

QUEER HUNTERS OF THE SEA



The sea-lion.



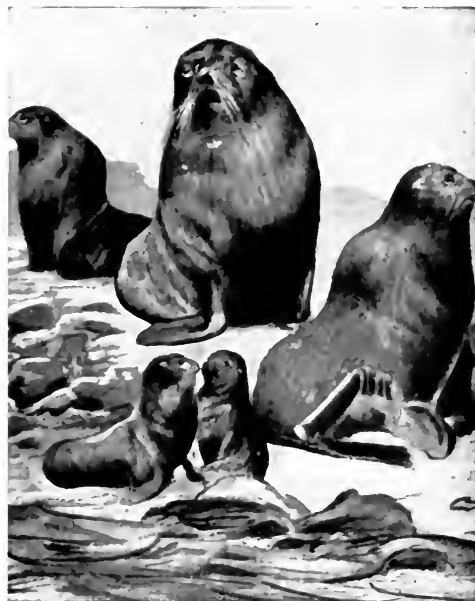
The bull walrus.



A female sea-elephant.



Sea-lions at the zoo.



Northern sea-bears or fur-seals.



The sea-elephant comes ashore.



The sea-lion of California.

Some of the photographs on these pages are by W. S. Berridge, H. Irving, H. Wright and F. W. Bond; others are from Sir Ernest Shackleton's books published by Heinemann.

THE SAD STORY OF 700,000 SEALSKINS AND A GREAT WASTE OF LIFE

Then a notable thing happened. The approaching extinction of the species led to an international agreement. Great Britain, Russia, Japan, the United States and Canada decreed by treaty that for a term of years there should be no more slaying of these seals at sea. In order to compensate the powers which could catch seals at large but were debarred from going to their breeding grounds, Russia and America agreed to pay them 15 per cent of their annual gains in sealskins. This applies only to the fur-seals.

The fur-seal story is one of marvel as well as of cruelty. Pursuit of the animals has led men far and wide into uncharted seas, and into privations such as only the love of gain could encourage. In one year Russian sealers, in order to keep up prices, threw into the sea 700,000 sealskins. This was a waste of life which might have produced millions from the animals so butchered.

But look at the map. Look at Alaska, that land of gold-mines and other metals dear to commerce, a land of wonderful animals and untold treasures. America bought it, nearly 600,000 square miles, seals and all, paying Russia \$7,200,000 for it in 1867. Within forty years America received more than that sum from duties paid by her hunters of seals.

At present the law is that fur-seals may be killed only by licensed hunters at their rookeries. The majority taken must be males, which greatly outnumber the females. This prevents the loss of 75 per cent of seals formerly attacked at sea, for of every four killed there three sank from sight. Each female caught on her way to or from the rookery left a pup to starve, and was prevented from bringing into the world another little one of which, in the course of nature, she would have been the mother.

THE GIANT WALRUS THAT CHARGES LIKE A SUBMARINE

Classification places the walrus next to the sea-lions and sea-bears, so we must do the same. After the whales and sea-elephants these are the giants of the sea mammals, though not in length, for a 13-foot sea-lion is their equal in that respect. But in bulk the walrus excels. A bull walrus in its prime is not far short of two tons in weight, and specimens exceeding a ton are not at all uncommon.

Their superb ivory tusks are less weapons of offense than implements employed in obtaining food. The walrus dives and rakes in the ooze for shellfish. He is not such a terror to other animals as the polar bear is on land, or the grampus in the waves. His diet is innocent, and when he is captured alive the great difficulty is to make him eat even the delicate fish that would nourish a human invalid. The Eskimos know walrus habits, and when they kill one, they first explore its stomach to obtain there the clams and other varieties of shellfish which the poor beast has eaten.

But though the walrus is peaceful enough in his haunts if left undisturbed, when he is wounded or when his friends or family are attacked, he is fury embodied. What a hippopotamus is in an African river, that the walrus is in an Arctic sea. It is then that the second service of the tusks is made manifest.

The walrus charges like a submarine intent on ramming, and he drives those ivory sickles of his through the timbers of a boat like a spoon through an eggshell. Many walrus adventures attended the sea passage of Peary on his perilous way to the North Pole.

HOW A WALRUS SHATTERED THE STOUT TIMBERS OF A WHALING BOAT

One giant bull succeeded in getting home a blow in full force at a great stout whaling boat. The timbers were shattered as if they had been paper! Great ungainly animals, they are intensely interesting studies as living object-lessons in nature's art of favoring bizarre developments of features helpful to a given method of life. But because they bear ivory, and their bodies contain blubber that can be rendered into oil, men have been as merciless and greedy toward them as they have toward so many other wild creatures.

The men who hunt for ivory would beggar the world of its finest animals. One example shall suffice. It is from an official statement laid before an important congress at Quebec. Whalers discovered a herd of walruses and coveted their tusks and hides. Though they knew that this herd afforded the only food of a tribe of Eskimos ashore, they slaughtered every walrus there. British explorers, following later in the train of these cruel men, found the Eskimos where the hunters had left them: every one of them was stark

A GROUP OF ODD MAMMALS



Crab-eating seals at home on the ice of the frozen North.



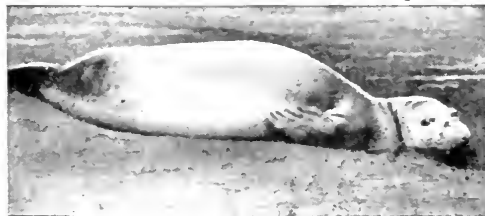
The South African sea-lion.



The walrus looks ahead.



Seals basking in the sunshine on the rocks.



The monk-seal lies in wait.



The hooded or bladder-nosed seal.

and silent—men, women and children had been starved to death!

THE SEAL THAT SOBS AND CRIES AS IF IT WERE A HUMAN BEING

We are more familiar with true seals than with walruses in this country. There are nearly a score of species of true seals. The harbor, the gray, the Greenland, the bearded, the monk-seal, the crab-eating seal, the fierce leopard-seal, which attacks less powerful members of the seal family, the Weddel, the Ross, and the crested-seal are the species with which people who frequent the sea are best acquainted.

Much as seals love the sea, the rivers and certain inland stretches of water, they thrive delightfully as pets. More intelligent friends no man ever had than these hoarse-voiced, sinuous waddling creatures from the deep sea.

When we see them active and clever in a state of nature, or at close quarters as our companions, we cannot believe that animal minds rise no higher in consciousness than that of a muddled man when he walks in his sleep. Indeed, there are many instances of their high intelligence.

When a seal is hurt or grieved it sobs and cries. When its little one is injured, the mother gives vent to desperate wails of misery, and tears stream down her poor face as if she were human.

With intelligence so highly organized, the seal naturally reveals first-class tactics as a hunter. It is wonderful to see half a dozen of them neatly drive a shoal of salmon or other fish into shallow water or into a bay, and then snap them up as dogs snap up meat at dinner.

As a matter of course, the seal has its enemies. Man is now the worst, but natural conditions produce the bear on ice or island and the shark and the grampus in the sea. The grampus takes seal after seal for his dinner. A shark, when a fisherman went to the rescue of a seal which the fish was attacking, bit the animal in two, disappeared with one half and left the remainder floating before the eyes of the astonished rescuer.

All of them love the sunshine from which the sea hides them. On icefloe or sandy strand they derive as much delight from sunlight and air as can be felt by the weariest of men released from a gloomy city. Seals frequenting the warmer waters seem to prefer sandy beaches.

Deadly parasites are known to be dangerous enemies of seals. These attack

the young, impoverish their blood, sometimes kill them outright, or leave them only to be saved from death by the restoring effects of a grand sea change.

Captain Frank Wild, who brought the Quest home after the death of Sir Ernest Shackleton, would give the seal tribe a testimonial as life-savers. On the voyage which cost Shackleton his ship in the Antarctic ice, Wild was left in charge of the men marooned on Elephant Island, while Shackleton did his great boat journey through mountainous seas in search of some vessel that might bring relief.

Food was terribly short on the island, and the shipwrecked mariners were almost at their wits' end, when one day, like a gift from the fairies, up sailed two or three seals to the beach. They were not only meat and oily drink in themselves: they brought food with them. In their stomachs were the fish they had just caught and eaten at sea. And these were now eaten a second time by the men whose very lives depended upon a minimum quantity of food day by day.

One other species we must note. It is the weirdest of all—the mighty elephant-seal, or sea-elephant. The name arises not only from the gigantic dimensions of the animal, but from a curious bladder-like formation about the nose. This hangs loose and limp, as a rule, but when the animal is excited, it is inflated and gives the seal the appearance of bearing about a fair copy of an elephant's trunk. The nostrils pierce the appendage, and the whole appearance of the creature is impressively grotesque.

The animal is another example of a species which has waxed gigantic under favorable circumstances. A male sea-elephant ranges up to close on twenty feet in length. In the water they are as agile as you please, but on land they are sloth itself. They assemble in herds, and though they roar as loudly as bulls, they are quite harmless and practically incapable of offense.

THE GRACEFUL WAY IN WHICH THE SEA-LION USES ITS FLIPPERS

No seal has quite lost the hand-like use of its flippers. The sea-lion is specially apt in their employment. With his front flippers he can guide a current of air to his head and body as we do with a sheet of paper. With his hind limbs he fans himself with quite artistic grace.

The sea-elephant uses his front pair

also as entrenching tools. He excavates a hollow in the sand in which his great body can lie. Stranger still, just as a real elephant picks up dust and scatters it over his body, so this titanic seal flicks up sand with his flippers to guard his ponderous frame against the excessive heat of the sun. An animal protected with blubber representing 250 gallons of oil may well fear heat from without.

Such, then, is a little of the harvest of interest we gather from a visit to a fascinating group of creatures that once took the line of least resistance and followed it into the sea. They are mariners without superiors—superb navigators of the wide free ocean. But they can adapt themselves to new conditions to-day as they did in the long ago.

Some of them can make themselves happy in fresh water, which few ocean fish can do. There are true seals in Lake Baikal, a huge fresh-water sea in Siberia; and also in the salt inland Caspian Sea. The presence of sea animals in these surroundings is taken as evidence that not long ago, as geology reckons time, these waters had free communication with the open ocean.

THE SEAL THAT TRAVELED THIRTY MILES OVERLAND IN A WEEK

It must be so. We know that some of the fur-seals travel far inland when driven by hunters; we know that a common gray seal has done an overland journey of thirty miles in a week in Norway. But that does not alter the probabilities as to Baikal and Caspian seals. They do not leave the sea and cross a country to landlocked waters. They went there when the way to and from the outer seas was open. A rising of land shut them up and made them prisoners forever. But they settled down and made the best of their lot, and there are as fine seals in

those two stretches of water as can be found anywhere.

After all, it was to be expected that animals might take kindly to fresh water and its fishy products, although themselves bred in the sea, for their ancestors made the greatest change of all in giving up the world which we ourselves inhabit for one of storm and tempest, deep unlighted abysses, and food which is always fish.

But they have remained mammals in every particular. Brains have grown in the best of them, and with brain added

to muscle and bone, flippers may serve quite well as feet for sojourns on land, and eclipse them completely for making progress in the water.

A TALE OF AN OLD SEAL

They tell a tale of a bit of coast visited from time to time by a "demon," a black and bulging demon, which throws showers of pebbles at anyone who approaches, and

then vanishes during the confusion.

"I don't believe it is a demon, not really," exclaimed a native to the writer. "I think it is an old fat seal scattering pebbles with its fins as it goes. But, sir, how it breathes so long out of the water is a caution to me!"

We who have now run through this story together could tell him the reason, could we not?

Occasionally one of these true seals learns where the fisherman's nets have been placed and makes a habit of robbing them, instead of fishing for itself. Perhaps the fisherman cannot be blamed if he seeks to kill such a thief, but thousands are shot by others for the sheer joy of killing. Others are killed for their skins, which make valuable leather. With all these enemies it is not surprising that several species are becoming scarce.

THE NEXT STORY OF ANIMAL LIFE IS ON PAGE 1127.



The seals come up through a hole in the ice.

ANIMALS LIVING ON LAND AND SEA



This is a sea-lion, one of the great seal family. Seals are born on land or on ice-floes; the mothers teach the young ones to swim. The poor animals are sought by hunters, who kill them for the sake of their fur, skin, oil and blubber.



The walrus shown here is a monstrous animal, 12 to 15 feet in length and very heavy. It waddles with difficulty on land. Its great tusks are used for the purpose of digging up the shellfish on which it lives. Generally it is peaceable, but when wounded, or when its young are attacked, it fights like a demon, and its tusks may tear a boat to pieces.



The small picture shows us a common seal. The larger animal is the sea-elephant. It measures from 20 to 30 feet in length and from 15 to 18 feet round. Its snout is lengthened into a sort of trunk. The body of a full-grown sea-elephant contains about 70 gallons of pure oil.

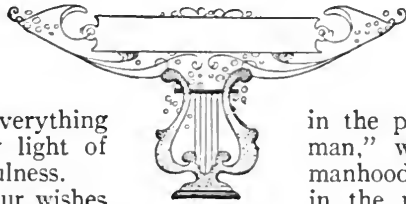


POETRY OF YOUTH AND MANHOOD

YOUTH is a period that lasts but a few years; a period of splendid visions. We see everything about us in the rosy light of happiness and hopefulness.

We think that all our wishes are to come true. Later, when the light in which we see things is less rosy, when all our fond wishes have not come to pass, we need not be less happy; but we shall be more wise, and realize that we wished impossible things. Yet it is only by having hope that we can do anything worth doing in this world, and youth gives us hope, which, if backed up by labor and effort, may enable us to do worthy things.

There are many poems of youth, but perhaps none so well known, and certainly none that sounds the steadfast note of high endeavor so clearly, as Longfellow's *Excelsior*, given on page 609. The spirit of youth is also felt in much good poetry that makes no direct appeal to young people; it is there because many of the great poets began to write while still in their "teens." Pope, Byron, Tennyson, and many more, wrote remarkable poems while they themselves were still youths. And, as youth is also a time when the heart is care-free and generous, most of the poetry written by the poets in their earlier years is full of noble sympathy for their fellow-creatures, of enthusiasm for every good cause.



It has been said that the poetry of childhood and youth may be summed up

in the phrase, "When I am a man," whereas the poetry of manhood may be summed up in the phrase, "When I was

young." To some extent this is true; but it would be more correct to say that "When I was young" is the poetry of old age. For, while youth is the period of hope, manhood is the time of achievement; in old age comes reflection.

Now, we have noticed certain things about English poetry that make it remarkable. There is a natural consequence of these things. English poets love nature and they sing the praise of childhood and youth, so it follows that they cannot but hold up a lofty ideal of manhood. There is nothing mean or ignoble in the manhood that is praised by English poets. Manhood includes every aspect of duty and conduct. A man should love his God, his country, his family and his friends. He must protect the weak and fight against wrong; at the same time he must keep himself truly humble. Poetry can inspire us to these fine things and manhood can achieve them. Remembering that the first use of poetry was to encourage men in the heat of battle against their foes, we shall do well to seek that same encouragement in our battles to-day.

SIR GALAHAD

Alfred, Lord Tennyson, who was for many years poet laureate of England, wrote many wonderful poems, but none more beautiful than the *Idylls of the King*, and Sir Galahad rings with a manly vigor tempered by a gentleness of feeling that characterizes the true knight as well as the true man.

MY good blade carves the casques of men,
My tough lance thrusteth sure,
My strength is as the strength of ten,
Because my heart is pure.
The shattering trumpet shrilleth high,
The hard brands shiver on the steel,
The splintered spear-shafts crack and fly
The horse and rider reel:
They reel, they roll in clanging lists,
And when the tide of combat stands,
Perfume and flowers fall in showers,
That lightly rain from ladies' hands.

How sweet are looks that ladies bend
On whom their favours fall!
For them I battle till the end,
To save from shame and thrall:
But all my heart is drawn above,
My knees are bowed in crypt and shrine:
I never felt the kiss of love,
Nor maiden's hand in mine.
More bounteous aspects on me beam,
The mightier transports move and thrill;
So keep I fair thro' faith and prayer
A virgin heart in work and will.

When on my goodly charger borne
Thro' dreaming towns I go,
The cock crows ere the Christmas morn,
The streets are dumb with snow.
The tempest crackles on the leads,
And, ringings, springs from brand and mail,
But o'er the dark a glory spreads,
And gilds the driving hail.
I leave the plain, I climb the height;
No branchy thicket shelter yields;
But blessed forms in whistling storms
Fly o'er waste fens and windy fields.

A maiden knight—to me is given
Such hope, I know not fear;
I yearn to breathe the airs of heaven
That often meet me here.
I muse on joy that will not cease,
Pure spaces clothed in living beams,
Pure lilies of eternal peace,
Whose odours haunt my dreams;
And, stricken by an angel's hand,
This mortal armour that I wear,
This weight and size, this heart and eyes,
Are touched, and turned to finest air.

The clouds are broken in the sky,
And thro' the mountain walls
A rolling organ-harmony
Swells up, and shakes and falls,
Then move the trees, the copses nod,
Wings flutter, voices hover clear;
"O just and faithful knight of God
Ride on! the prize is near."
So pass I hostel, hall, and grange;
By bridge and ford, by park and pale,
All-armed I ride, whate'er betide,
Until I find the Holy Grail.

PROSPICE

In another part of this work we have given the beautiful poem *Crossing the Bar*, which was Alfred, Lord Tennyson's farewell to life. Here we quote *Prospice*, by Robert Browning, the noblest swan-song that has ever been written.

FEAR death?—to feel the fog in my throat,
The mist in my face,
When the snows begin, and the blasts denote
I am nearing the place,
The power of the night, the press of the storm,
The post of the foe;
Where he stands, the Arch Fear in a visible form.
Yet the strong man must go:
For the journey is done and the summit
attained,
And the barriers fall,
Though a battle's to fight ere the guerdon be
gained,
The reward of it all.
I was ever a fighter, so—one fight more,
The best and the last:
I would hate that death bandaged my eyes,
and forbore,
And bade me creep past.
No! let me taste the whole of it, fare like my
peers
The heroes of old,
Bear the brunt, in a minute pay glad life's
arrears
Of pain, darkness and cold.
For sudden the worst turns the best to the brave,
The black minute's at end,
And the elements' rage, the fiend voices that
rave,
Shall dwindle, shall blend,
Shall change, shall become first a peace out
of pain,
Then a light, then thy breast,
O thou soul of my soul! I shall clasp thee again,
And with God be the rest!

DIRGE FOR A SOLDIER

An American, George Henry Boker, wrote this martial dirge for the soldier whose work was finished. He had done his duty, and had willingly laid down his life for his country and his flag.

CLOSE his eyes; his work is done!
What to him is friend or foe-man,
Rise of moon or set of sun,
Hand of man or kiss of woman?
Lay him low, lay him low,
In the clover or the snow!
What cares he? he cannot know;
Lay him low!

Fold him in his country's stars,
Roll the drum and fire the volley!
What to him are all our wars?—
What but death bemocking folly?
Lay him low, lay him low,
In the clover or the snow!
What cares he? he cannot know;
Lay him low!

As man may, he fought his fight,
Proved his truth by his endeavour;
Let him sleep in solemn night,
Sleep for ever and for ever.
Lay him low, lay him low,
In the clover or the snow!
What cares he? he cannot know;
Lay him low!

THE END OF LIFE

Weseldom have blank verse in our Book of Poetry, for reasons which were explained on page 100. The following extract is in blank verse, and is taken from a very long poem called *Festus*, which had a great success in the days of our grandfathers, but is seldom read now. It was written by Philip James Bailey, who was born in 1816 and died in 1902. These lines teach us that action should be the purpose of our life.

WE live in deeds, not years; in thoughts,
not breaths;
In feelings, not in figures on a dial.
We should count time by heart-throbs. He
most lives
Who thinks most, feels the noblest, acts the
best.
And he whose heart beats quickest, lives the
longest;
Lives in one hour more than in years do some
Whose fat blood sleeps as it slips along their
veins.
Life is but a means unto an end; that end,
Beginning, mean, and end to all things—God.

WISHING

We have already read several of the tuneful little poems by William Allingham. This is another by the same writer. Wishing is, indeed, a profitless occupation; but if we have fancy or imagination we cannot help "wishing" at times, and after all, though we have always to come back to the facts of our daily life, just as the "rover" returned for his mother's kiss, if we are wise we shall find that the things we have are usually those that for us are best worth having.

RING-TING! I wish I were a Primrose,
A bright yellow Primrose blowing in
the spring!

The stooping boughs above me,
The wandering bee to love me,
The fern and moss to keep across,
And the Elm-tree for our King!

Nay—stay! I wish I were an Elm-tree,
A great lofty Elm-tree, with green leaves gay!
The wind would set them dancing,
The sun and moonshine glancing,
The Birds would house among the boughs,
And sweetly sing!

O—no! I wish I were a Robin,
A Robin or a little Wren, everywhere to go;
Through forest, field, or garden,
And ask no leave or pardon,
Till Winter comes with icy thumbs
To ruffle up our wing.

Well—tell! Where should I fly to?
Where go to sleep in the dark wood or dell?
Before a day was over,
Home comes the rover,
For Mother's kiss, sweeter this
Than any other thing!

LITTLE THINGS

The writer of these children's verses was not known as a poet, but as a compiler of books of reference for students. His name was Ebenezer Cobham Brewer, and he died in 1897 aged eighty-seven. Little Things has long been a favorite.

LITTLE drops of water,
Little grains of sand,
Make the mighty ocean
And the pleasant land.

Thus the little minutes,
Humble though they be,
Make the mighty ages
Of eternity.

Thus our little errors
Lead the soul away
From the path of virtue,
Far in sin to stray.
Little deeds of kindness,
Little words of love,
Make our earth an Eden,
Like the heaven above.
Little seeds of mercy,
Sown by youthful hands,
Grow to bless the nations
Far in heathen lands.

THE BLIND BOY

Colley Cibber was a famous actor and writer of comedies who lived from 1671 to 1757. He was also poet laureate. These pathetic verses, which have been long familiar in the children's books of several generations, were written by him.

O SAY, what is that thing call'd light,
Which I must ne'er enjoy;
What are the blessings of the sight?
O, tell your poor blind boy!

You talk of wondrous things you see,
You say the sun shines bright;
I feel him warm, but how can he
Or make it day or night?

My day or night myself I make
When'er I sleep or play;
And could I ever keep awake
With me 'twere always day.

With heavy sighs I often hear
You mourn my hapless woe;
But sure with patience I can bear
A loss I ne'er can know.

Then let not what I cannot have
My cheer of mind destroy;
Whilst thus I sing, I am a king,
Although a poor blind boy.

THE SHEPHERD'S COT

William Shenstone, the author of this artless little poem of rural life, was born in 1714 and died in 1763. He was a pleasant writer, but is not among the notable poets of England.

MY banks they are furnished with bees,
Whose murmur invites one to sleep;
My grottoes are shaded with trees,
And my hills are white over with sheep.
I seldom have met with a loss,
Such health do my fountains bestow;
My fountains all bordered with moss,
Where the harebells and violets blow.

Not a pine in the grove is there seen,
But with tendrils of woodbine is bound;
Not a beech's more beautiful green,
But a sweetbriar entwines it around.
Not my fields in the prime of the year,
More charms than my cattle unfold;
Not a brook that is limpid and clear,
But it glitters with fishes of gold.

I have found out a gift for my fair,
I have found where the wood-pigeons
breed;
But let me such plunder forbear,
She will say 'twas a barbarous deed;
For he ne'er could be true, she averred,
Who would rob a poor bird of its young;
And I loved her the more when I heard
Such tenderness fall from her tongue.

THE BUTTERFLY'S BALL

William Roscoe, who died in 1831, was a writer of historical works; but he could also write lively and fanciful poetry, as we may see from this delightful piece of fancy, which is certainly among the best of all the poetry written by him.

COME, take up your hats, and away let us haste
To the Butterfly's ball and the Grasshopper's feast;

The trumpeter Gadfly has summon'd the crew,
And the revels are now only waiting for you.

On the smooth shaven grass by the side of the wood,

Beneath a broad oak that for ages has stood,
See the children of earth, and the tenants of air,

For an evening's amusement together repair.

And there came the Beetle, so blind and so black,

Who carried the Emmet, his friend, on his back;

And there was the Gnat and the Dragon-fly too,

With all their relations, green, orange and blue.

And there came the Moth in his plumage of down,

And the Hornet in jacket of yellow and brown,
Who with him the Wasp his companion did bring,

But they promised that evening to lay by their sting.

And the sly little Dormouse crept out of his hole,

And led to the feast his blind brother the Mole;

And the Snail, with his horns peeping out from his shell,

Came from a great distance—the length of an ell.

A mushroom their table, and on it was laid
A water dock leaf, which a table-cloth made;
The viands were various, to each of their taste,

And the Bee brought his honey to crown the repast.

There close on his haunches, so solemn and wise,

The Frog from a corner look'd up to the skies;
And the Squirrel, well pleased such diversion to see,

Sat cracking his nuts overhead in a tree.

Then out came the Spider, with fingers so fine,

To show his dexterity on the tight line:
From one branch to another his cobwebs he slung.

Then as quick as an arrow he darted along.

But just in the middle, oh! shocking to tell!
From his rope in an instant poor Harlequin fell;

Yet he touch'd not the ground, but with talons outspread,

Hung suspended in air at the end of a thread.

Then the Grasshopper came with a jerk and a spring,

Very long was his leg, though but short was his wing;

He took but three leaps, and was soon out of sight,

Then chirp'd his own praises the rest of the night.

With step so majestic the Snail did advance,
And promised the gazers a minuet to dance;
But they all laugh'd so loud that he pull'd in his head,

And went in his own little chamber to bed.

Then as evening gave way to the shadows of night,

The watchman, the Glow-worm, came out with his light;

Then home let us hasten while yet we can see,
For no watchman is waiting for you and for me.

TO A MOUSE

This is one of the best known poems of Robert Burns, the plowman-poet. It illustrates his tenderness of heart to the smallest and humblest creatures. Without meaning to, in plowing a field, he has overturned the nest of the wee mouse who hastily begins to run away. *Brattle* means clatter, *pattle* a stick, *daimen icker* an occasional ear, *thraive* sheaves, *laive* remainder, *foggage* stray vegetable material, *snell* biting, *coulter* plow, *hald* abiding-place, *thole* endure, *cranreuch* frost.

WEE, sleekit, cow'rin', tim'rous beastie,
O, what a panic's in thy breastie!

Thou need na start awa' sae hasty,

Wi' bickering brattle!

I wad be laith to rin an' chase thee,

Wi' murd'ring pattle!

I'm truly sorry man's dominion

Has broken Nature's social union,

An' justifies that ill opinion,

Which makes thee startle

At me, thy poor, earth-born companion,

An' fellow-mortal!

I doubt na, whiles, but thou mayst thieve;

What then? poor beastie, thou maun live!

A daimen icker in a thrave

'S a sma' request;

I'll get a blessin' wi' the laive,

And never miss't!

Thy wee bit housie, too, in ruin!

Its silly wa's the win's are strewin'!

An' naething, now, to big a new ane,

O' foggage green!

An' bleak December's winds ensuin',

Baith snell an' keen!

Thou saw the fields laid bare an' waste,

An' weary winter comin' fast,

An' cozie here, beneath the blast,

Thou thought to dwell,—

Till, crash! the cruel coulter passed

Out through thy cell.

That wee bit heap o' leaves an' stibble

Has cost thee mony a weary nibble!

Now thou's turned out, for a' thy trouble,

But house or hald,

To thole the winter's sleety dribble,

An' cranreuch cauld!

But, Mousie, thou art no thy lane,
In proving foresight may be vain:
The best-laid schemes o' mice an' men,
Gang aft a-gley,
An' lea'e us naught but grief an' pain,
For promised joy!

Still thou art blest, compared wi' me!
The present only toucheth thee:
But, och! I backward cast my e'e
On prospects drear!
An' forward, though I canna see,
I guess an' fear!

MINNIE AND WINNIE

As we have often seen, the great poet who writes of the most serious things can also write with charm and delight about the littlest childlike fancies. This Lord Tennyson proves in these quaint little verses to Minnie and Winnie. They are as sweet and delicate as the pretty pink-lined shell itself.

MINNIE and Winnie
Slept in a shell
Sleep, little ladies!
And they slept well

Pink was the shell within,
Silver without;
Sounds of the great sea
Wander'd about.

Sleep, little ladies!
Wake not soon!
Echo on echo
Dies to the moon.

Two bright stars
Peep'd into the shell.
"What are they dreaming of?
Who can tell?"

Started a green linnet
Out of the croft;
Wake, little ladies,
The sun is aloft!

GOOD-NIGHT, GOOD-NIGHT!

Joanna Baillie was one of the most popular women writers in the first half of the nineteenth century. Her poetry was read throughout the length and breadth of the English-speaking world, and several of her plays were performed with success. These beautiful lines are taken from one of her poems.

THE sun is down, and time gone by,
The stars are twinkling in the sky,
Nor torch nor taper longer may
Eke out a blithe but stinted day;
The hours have passed with stealthy flight,
We needs must part: good-night, good-night!

The lady in her curtained bed,
The herdsman in his wattled shed,
The clansman in the heathered hall,
Sweet sleep be with you, one and all!
We part in hopes of days as bright
As this gone by: good-night, good-night!

Sweet sleep be with us, one and all!
And if upon its stillness fall
The visions of a busy brain,
We'll have our pleasures o'er again,
To warm the heart, to charm the sight,
Gay dreams to all! good-night, good-night!

THE LAND OF NOD*

As we are already acquainted with Robert Louis Stevenson's beautiful little poems, we might almost guess that this Land of Nod had been written by him, its manner is so peculiar to that charming poet. The "land" is, of course, none other than the strange country we often visit in our dreams.

FROM breakfast on through all the day
At home among my friends I stay;
But every night I go abroad,
Afär into the land of Nod.

All by myself I have to go,
With none to tell me what to do—
All alone beside the streams,
And up the mountain-sides of dreams.

The strangest things are there for me,
Both things to eat and things to see.
And many frightening sights abroad
Till morning in the land of Nod.

Try as I like to find the way,
I never can get back by day,
Nor can remember plain and clear
The curious music that I hear.

HOHENLINDEN

One of the most famous battle poems, this was written by Thomas Canpbell soon after the great battle which was fought in the year 1800. "Furious Frank and fiery Hun" refers to the opposing forces. The French or Franks, led by a great general named Moreau routed the Austrians, who, for poetical purposes, may be regarded as descendants of the old Huns, the warriors that once overran most of Europe.

ON Linden, when the sun was low,
All bloodless lay the untrodden snow;
And dark as winter was the flow
Of Iser, rolling rapidly.

But Linden showed another sight,
When the drum beat at dead of night,
Commanding fires of death to light
The darkness of her scenery.

By torch and trumpet fast arrayed,
Each horseman drew his battle-blade,
And furious every charger reared
To join the dreadful revelry.

Then shook the hills, with thunder riven;
Then rushed the steed, to battle driven;
And, louder than the bolts of heaven,
Far flashed the red artillery.

But redder yet that light shall glow,
On Linden's hills of stained snow
And bloodier yet the torrent flow
Of Iser, rolling rapidly.

'Tis morn: but scarce yon level sun
Can pierce the war-clouds, rolling dun,
Where furious Frank and fiery Hun
Shout in their sulphurous canopy.

The combat deepens. On, ye brave,
Who rush to glory, or the grave!
Wave, Munich, all thy banners wave!
And charge with all thy chivalry!

Few, few shall part, where many meet!
The snow shall be their winding-sheet,
And every turf beneath their feet
Shall be a soldier's sepulchre!

* From *The Complete Poems of Robert Louis Stevenson*, copyright, 1905, 1923, by Charles Scribner's Sons. By permission of the publishers.

LITTLE VERSES FOR VERY LITTLE PEOPLE

DANCE to your daddie,
My bonnie laddie,
Dance to your daddie, my bonnie lamb!
You shall get a fishie,
On a little dishie,
You shall get a herring when
the boat comes hame!



Dance to your daddie,
My bonnie laddie,
Dance to your daddie, and to
your mammie sing!
You shall get a coatie,
And a pair of breebies,
You shall get a coatie when the boat
comes in!

GIRLS and boys come out to play,
The moon doth shine as bright as
day;

Leave your supper, and leave your sleep,
And come with your playfellows into the
street.

Come with a whoop, come with a call,
Come with a goodwill or not at all.
Up the ladder and down the wall,
A halfpenny roll will serve us all.
You find milk, and I'll find flour,
And we'll have a pudding in half-an-
hour.

PAT-A-CAKE, pat-a-cake, baker's man.
So I will, master, as fast as I can:
Pat it and prick it and mark it with T,
Put it in the oven for Tommy and me.

TAFFY was a Welshman, Taffy was a
thief,
Taffy came to my house, and stole a
piece of beef;
I went to Taffy's house, Taffy wasn't
home;
Taffy came to my house, and stole a
marrow-bone;
I went to Taffy's house, Taffy wasn't
in;
Taffy came to my house, and stole a
silver pin;
I went to Taffy's house, Taffy was in
bed;
I took up a poker and flung it at his
head.

SEA-GULL, sea-gull, sit on the sand,
It's never good weather when you're
on the land.

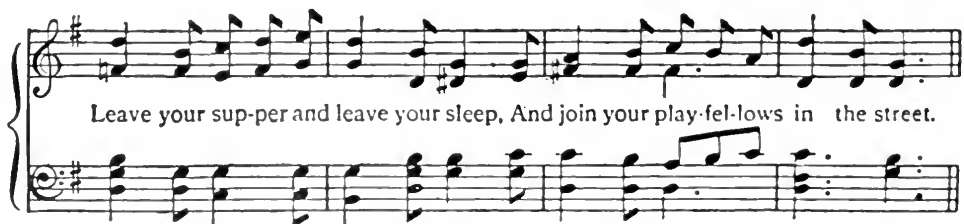
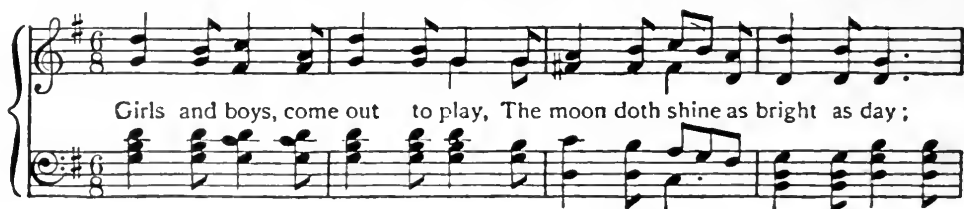


AS I walked by myself,
And talked to myself,
Myself said unto me:
Look to thyself,
Take care of thyself,
For nobody cares for thee.

I answer'd myself,
And said to myself,
In the self-same repartee,
Look to thyself,
Or not look to thyself,
The self-same thing will be.

HIGGLEDY Piggledy, here we lie,
Picked and plucked, and put in a
pie!

GIRLS AND BOYS COME OUT TO PLAY





THERE was a monkey climb'd up a tree,
When he fell down, then down fell he.

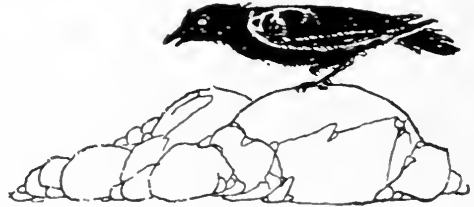
There was an old woman who ate an
apple,
When she ate two, she ate a couple.



There was a butcher
who cut his thumb,
When it did bleed,
then blood did
come.



There was a cobbler
clouting shoon,
When they were
mended, they were
done.



There was a crow sat on a stone,
When he was gone, then there was none.



There was a horse going to a mill,
When he went on, he stood not still.



There was a jockey ran a race,
When he ran fast, he ran apace.

There was a navy went into Spain,
When it return'd, it came again.



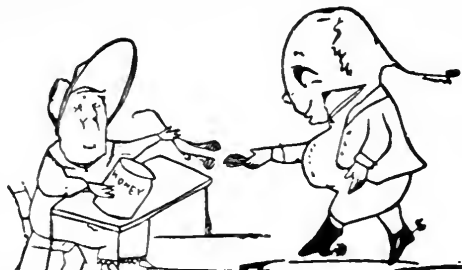
THE NONSENSE OF EDWARD LEAR



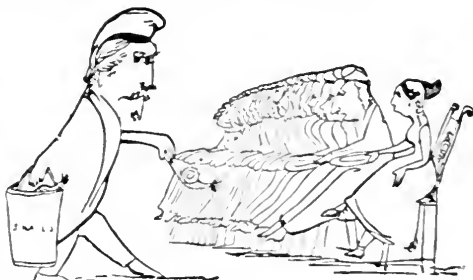
THERE was an old man who said, "Hush!
I perceive a young bird in this bush!"
When they said, "Is it small?"
He replied, "Not at all!
It is four times as big as the bush!"



THERE was an old person of Mold,
Who shrank from sensations of cold;
So he purchased some muffs,
Some furs, and some fluffs,
And wrapped himself from the cold.



THERE was an old man of Kilkenny,
Who never had more than a penny;
He spent all that money
In onions and honey,
That wayward old man of Kilkenny.



THERE was an old person of Sparta,
Who had twenty-five sons and one
daughter;
He fed them on snails,
And weighed them in scales,
That wonderful person of Sparta.



THERE was a young lady of Bute,
Who played on a silver-gilt flute;
She played several jigs
To her uncle's white pigs,
That amusing young lady of Bute.



THERE was an old man of Corfu,
Who never knew what he should do;
So he rushed up and down,
Till the sun made him brown,
That bewildered old man of Corfu.



THERE was an old man of Coblenz,
The length of whose legs was immense;
He went with one prance
From Turkey to France,
That surprising old man of Coblenz.



THERE was an old person of Dutton,
Whose head was small as a button;
So to make it look big
He purchased a wig,
And rapidly rushed about Dutton.



The loveliness of the wild foxglove, which produces a million seeds in a summer.

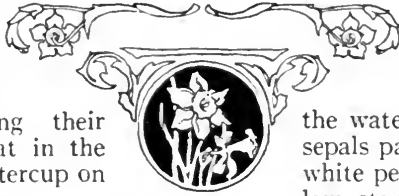
FLOWERS AND FRUITS

THE purpose of the flower is to produce seeds, and seeds are young plants just beginning their careers. We saw that in the picture-story of a buttercup on page 508.

But we have already seen that the flower first makes spores—little spores called pollen-grains and big spores that develop into embryo-sacs. The transformed leaf-structures that make the pollen-grains are the *stamens*, and the transformed leaf-structures that make the embryo-sacs are the *carpels*. A male cell in the pollen-grain fertilizes an egg-cell inside the embryo-sac. One of the uses of a flower is to bring it about that the pollen-grains are scattered, and that some are dusted on to the stigma, or carpel-tip.

The poet Goethe was one of the first to see clearly that a flower consists in ordinary cases of four tiers, or whorls, of different leaf-structures which have been changed for different purposes. It is nature's way to make apparently new things out of old things, and the flower consists of four whorls of transformed leaves. These are:

1. The sepals which protect the bud and steady the blossom.
2. The petals which shelter the more important parts and also attract insect-visitors.
3. The stamens that make pollen.
4. The carpels that make embryo-sacs, within each of which there is an egg-cell.



That the parts of a flower are transformed leaves may be seen in a case like

the water-lily, where the green sepals pass quite gradually into white petals, and these into yellow stamens. It is sometimes

difficult to tell where one stops and the other begins. When flowers become double, it generally means, as when a wild rose becomes a garden rose, that what should have developed into stamens have sunk back into parts nearer leaves—the parts we call petals. One sometimes finds a Canterbury bell in which the whole flower has become a crowded tuft of green leaves. This may happen when a plant is too well fed; it ceases to be floral and becomes more leafy. It will be understood that sepals and petals are nearer to leaves than are stamens and carpels, which are leaf-structures transformed in connection with spore-forming or seed-forming.

"You will find," Mr. Ruskin said, "that all plants are composed of two parts:

The leaf and the root, one loving the light and the other darkness; one liking to be clean, the other to be dirty; one liking to grow for the most part up, the other for the most part down; and each having faculties and purposes of its own. But the pure one which loves the light has, above all things, the purpose of being married to another leaf, and having child-leaves, and children's children of leaves,

to make the Earth fair for ever. And when the leaves marry they put on wedding-robcs, and are more glorious than Solomon in all his glory, and they have feasts of honey, and we call them flowers."

This is finely said, but we should be careful to notice that stamens are not really *male* parts, nor the carpels *female* parts. They are spore-making organs, and the spores are made in the pollen-sacs and ovules. So when a flower has stamens only and another carpels (with ovules) only, it is better to call them *staminate* and *pistillate* flowers, rather than male and female flowers.

THE WAY POLLEN IS CARRIED ABOUT FROM FLOWER TO FLOWER

The pollen-grains are of different colors and shapes and sizes, but they are usually yellow and dry; and we may speak of them as grains of golden dust. What is important is that they should reach the usually moist and sticky tip, or stigma, of the pistil. There each sends out a delicate pollen-tube which contains the male cell, and makes its way down the interior of the carpel to reach the egg-cell within the embryo-sac, which is within the ovule, which is within the ovary! The union of the male cell and the egg-cell is called fertilization; it is the beginning of a new individual life. But the dusting of the tip of the pistil with pollen is called *pollination*, and it is brought about in one of three chief ways.

Sometimes, as in grasses and sedges, alders and birches, oaks and elms, the pollen is carried by the wind from flower to flower. This is the oldest method, which lasted for ages; but it is very wasteful. Thus, in the pine forests there is sometimes so much pollen that it is borne up by the wind like clouds of smoke, and when it sinks to the ground—as much of it does—people talk of a sulphur shower.

THE BUSY BEE PAYS ITS CALL IN THE GARDEN

The second method, which is seen in most flowering plants with notable blossoms, is by means of insects or some other flower-visiting animals. The visitors, such as bees, come for the sake of the nectar and the pollen itself; and the color and fragrance may be useful advertisements. They get dusted with pollen and land some of this on the pistil of a neighboring flower of the same kind, for they often pay many visits one after the other to the

same species. If the bumblebee is visiting, let us say, aconite one forenoon, it will keep to aconite for a while, so that the pollens are not so much mixed as one might expect.

It has been shown that various insects can distinguish different colors, and not only colors but different degrees of brightness; and it is likely that in the course of their individual experience they learn that the colors and brightness of certain flowers mean plenty of nectar and pollen. As we say, they learn to *associate* certain flags of color with certain feasts of honey. The same applies to the fragrance of some flowers; it appeals to the sense of smell, which is very keen in some insects, such as bees. Some odors that are repulsive to us are attractive to insects, and thus we find that some flowers with an evil smell are eagerly sought by certain flies, which lay their eggs in them and bring about pollination in so doing. In South America many flowers are pollinated by humming-birds, and even the slow-going snails may dust pollen on the flowers they visit. This happens, for instance, in the little golden saxifrage of damp woods.

HOW NATURE PROTECTS THE SEED OF THE PLUM AND CHERRY

In a small number of plants, such as the common pea and the wheat, self-fertilization occurs. The pollen-grains from the stamens of a flower land on the stigma of the same flower, and send out their pollen-tubes. It is interesting to note that in some cases where pollen-grains pass from stamens to stigmas of the same flower they do no useful work, for they do not send out pollen-tubes. Such are some of the doings of the flower; let us consider the fruit.

The fruit consists of the ripe seed-box or seed-boxes, to which may be added some extra parts, such as an expanded flower-stalk, as in the rose-hip; or a fleshy flower-stalk and green sepals, as in the strawberry. When we use the word fruit we think at once of something juicy, but we cannot separate dry fruits from soft fruits, and even the fruiterer's shop window shows many dry fruits.

If we look at such a common kind of fruit as a plum or a cherry, we distinguish at once the firm outer skin, the juicy pulp and the stone. The last contains the seed, or kernel. As it is hard and woody, it protects the very young plant inside from being digested in a bird's food-canal or

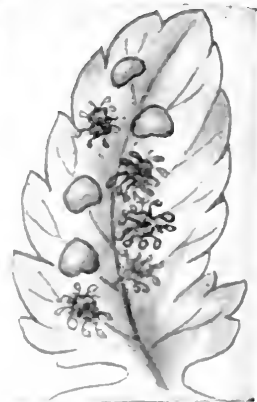
LIFE-STORY OF A FERN'S 1,000 MILLION SPORES



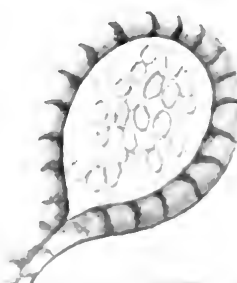
1. This is part of the upper side of a frond of a male shield fern. In one year this fern will scatter 1,000 million spores.



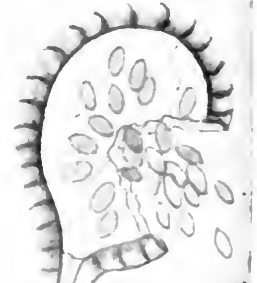
2. The under-surface of part of a frond dotted with little spore cases called sporangia.



3. Part of the frond magnified to show spore cases, some with their wax-like covering.



4. An unripe case with the spores inside before the wall bursts to release them.



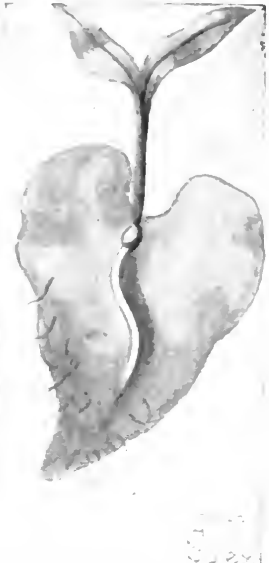
5. A spore case discharging the spores, which are carried away by the wind.



6. The spore falls to the ground, where it swells and bursts. It sends down a rootlet and forms a thin flat green expansion called the prothallium. At the top are the egg-bearing organs; below, sperm-bearing organs.



7. Enlarged view of egg-bearing organ. The spiral bodies with tufts of hair called cilia are sperms and seek the egg-cells.



8. After being fertilized the egg begins to grow. It draws nourishment from the prothallium, and develops roots.

frost-bitten in the soil. It also keeps the seed from sprouting too soon. The use of the juicy pulp, which is sheer loss to the plant, is to attract birds and beasts that eat the fruit but at the same time scatter the seeds.

The outer skin prevents the fruit from drying in the sun, and it keeps out bacteria and molds unless it is in some way broken. Everyone knows how quickly a plum goes bad if the skin is pierced by a bird's peck or a wasp's bite. The "going bad" means that bacteria have got in at the wound.

There are three great kinds of dry fruits and two great kinds of soft fruits. The first set of dry fruits includes the box-fruits (capsules), which liberate the seeds by bursting or gaping or opening in some way, as in the case of pea-pods, turnip-fruits and poppy-heads. The second set, known as splitters, divide into pieces, each inclosing a seed which is not liberated till it sprouts in the ground. We see this kind of fruit in all the members of the hemlock order, in mallows and in plants like the white dead-nettle. Thirdly, there are all sorts of nuts and nutlets, which do not split or liberate the seed till the time of sprouting. These may be illustrated by hazel-nuts, by green fruits of the buttercup and by grains of wheat.

HOW STRAWBERRIES, RASPBERRIES AND FIGS ARE FORMED

The soft fruits are either stone-fruits, with the seed inside the hard innermost layer, as in plum, peach and cherry, or berries which have the seeds imbedded in a juicy pulp, as in grapes, gooseberries and currants. The hard thing in a cherry is the stone; the hard thing in a mistletoe berry is a seed. So, looking backward, we have box-fruits, splitters, nuts, stone-fruits and berries. To these, however, must be added a number of difficult fruits. A strawberry is a collection of tiny yellowish nutlets on the rounded red surface of the fleshy top of the flower-stalk. A raspberry is a collection of little stone-fruits perched on the soft, conical tip of the stalk. More complicated is the fig, where a whole group of fruits, each from a separate flower, is inclosed in a fleshy cup.

The uses of the fruit are all bound up with the seeds. Some fruits protect the seeds from frost and seed-eating enemies; some attract the attention of fruit-eating

birds and mammals. That is profitable when the visitors do not digest the seeds; some scatter the seeds by explosion or by forming parachutes; and some prevent the seed from sprouting too quickly in the ground. These are the ordinary uses of fruits, but perhaps they may be more clearly understood if we keep in mind the following facts. They are the principal points to remember in studying the whole subject of the development of fruits of every sort and kind.

THE SUGAR-FACTORY WORKING INSIDE A GREEN PLANT

1. Fruits are usually built up of transformed leaf-structures, or carpels, which naturally tend to dry and die. This throws light on the splitting of dry fruits.

2. Many juicy fruits are rich in sugar, and the green plant is a sugar-factory. It is natural that after the nectaries of the flower close up—having played their part in attracting insect-visitors—there should be a redirection of the surplus sugar into the fruit.

3. Many soft fruits have at least seventy-five per cent of water. This must come, of course, from the soil, and we can understand better how it can be spared if we remember that the leaves are no longer using or losing so much water.

4. Seeds are rich in nitrogenous food-stuffs of great value as nourishment which form a legacy for the next generation. But what is in the fruit is not handed on, and is so much loss to the plant. We understand, therefore, why the fruits contain comparatively little in the way of protein, but often much in the way of sugar, which is less nourishing.

5. Everyone is familiar with the great difference between an unripe apple or plum and a ripe one. This is due to the chemical changes of ripening, such as fermenting starch into sugar, making ethers and oils of fine fragrance, and also in many cases making coloring matter, as in the apple's rosy cheeks.

FRUIT AS A LINK BETWEEN PARENT AND SEED

6. As we have just said, the treasures of fruits, so precious to man in apple and orange, grape and banana, and scores of other cases, represent so much loss to the plant, but in some plants the fruit is the link between the parent and the developing seeds which are laying up stores for the growing time.

THE NEXT STORY OF PLANT LIFE IS ON PAGE 1033.



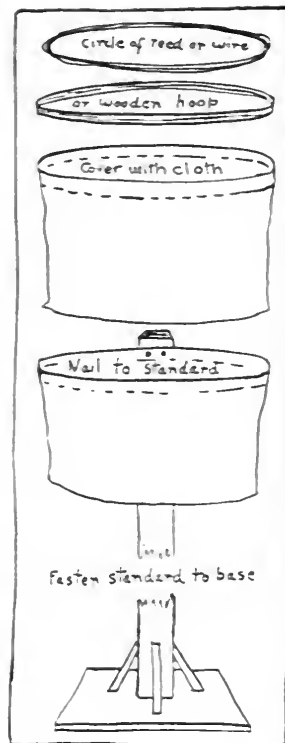
MORE WORTHWHILE GAMES



THERE are many things to do with a big rubber ball. You know how well you can bounce and catch it. Can you throw it into a basket? Let's keep score and see how well you can do that. The basket ball and standard in the picture are as some boys and girls made them. You

can make the bottom the way father fixes your Christmas tree, as in the picture, or you can get a little concrete or cement from some near-by builders and pour some of it into a big can and put the standard in it firmly.

NOW you need the basket. You can make a circle of reed or wire. Wrap it around two or three times to make it strong enough to hold the basket and tie it firmly with a string. Then sew a piece of cloth over this frame and nail your basket to the top of your standard.



Begin practicing for the game by standing one foot away from the standard. Throw the ball. If you get it easily into the basket, step back another foot. If you haven't a foot rule make one out of a strip of wood or cardboard. You can measure off from mother's tape measure or father's pocket foot rule. Find the digits that look like this, "12." This says twelve. Measure your cardboard to that mark and cut it off. Now you have a foot rule to measure from your standard to your starting place.

Let's begin scoring standing at two feet from the standard. Get your score book and draw a picture of the standard at the top of the page. Throw the ball five times. Score the number of times you get it into the basket. You can write the digits now when you score, if you are sure you know them Just Right.

If you score Just Right at two feet, change your starting place. Measure off another foot with your foot rule. Put the digit "3" at the beginning of these scores to show that you are throwing three feet. Be sure each time you stop playing to put a **ring** around your best score.

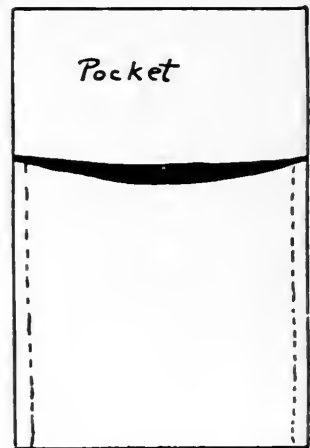
Of course you can make up fine ways to play Basket Ball when the other children come to play with you. You can take turns in throwing and help each other score.

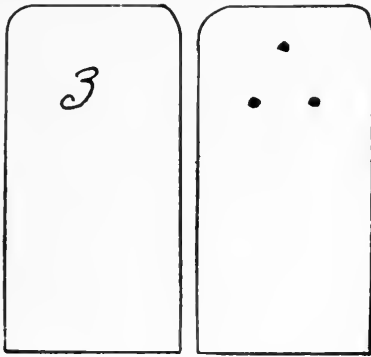
If you are sure you know your digits Just Right here is a good game of Basket Ball.

Make a pocket to put on your standard and some cards to put in the pocket. This is the way to make the scoring pocket. Cut a strip of strong material (old curtain shade is very good) two inches wide. This is two inches: |—————|—————|
Cut your strip five inches long. This is five inches:

|—————|—————|—————|—————|—————|

Fold the strip like the picture. The front of the pocket is two inches tall. Sew the edges and fasten the thread well so it will stay when you put the cards in and out. Tack the score pocket on to the standard.





Cut six cards. Make them three inches tall. This is three inches:



Make them one and a half inches wide.

This is one and a half inches:



On the front side of each card paste one of the digits from page 2 of the Work

Book. Use the bottom row of printed digits that look like these: 1, 2, 3, 4, 5. On the back of each card put the number of stickers that the digit says. To be sure how many that is, look back to page 520.

Put these cards you have made in the score pocket. Mark off your starting place. If you can score Just Right at two feet, begin this game at three feet. Each child take a turn. When it is your turn, throw the ball three times. Each time it goes into the basket, take out the front card from the pocket. You will probably get the ball in twice out of three throws. So you score as many as both the numbers on the cards you took from the pocket. If you can write the digit that tells how many that is, write it in your score book. If not, put down the marks. We can learn the new digits in a game soon.

Of course, when you can get all three balls in the basket in three turns, you need to add another foot to your starting distance. That will make you throw four feet instead of three. Be sure to mark in your score book the distance you throw, for the game is harder the farther you throw. Every time you throw the ball three times and get it in each throw, stop and count up score and change your distance.

When each of you has had a turn, you can find out who wins that turn. Count your marks. The one with the most marks wins the turn. If you win, draw a line under your score marks. If your playmate wins, he will draw a line under his score marks. When you stop playing put down the number of

//	///
///	/
///	////
////	////
/	//
3	

One side -
make this blue

•	1
• • • •	4
	0
• • •	3
• •	2
• • • • • •	5

The other side -
make this red

• •	2
• • • •	4
•	1
• • • • • •	5
	0
• • •	3

turns you have won. That is your score in the game.

Here is a game that will help you with writing down your scores. Cut a piece of material one foot long and one-half foot wide. To find a half a foot cut a strip of paper one foot long. Fold it in the middle and mark where the middle is. That is a half a foot. Now you can make your material half a foot wide. Then divide it with lines as in the picture. Each space is two inches wide. This is two inches: |—————|—————| Make the lines with a blue crayon and put on the digits and the blue stickers just as the picture shows you. You will find the digits on page 3 of your Work Book. These digits are written, for this is a writing game.

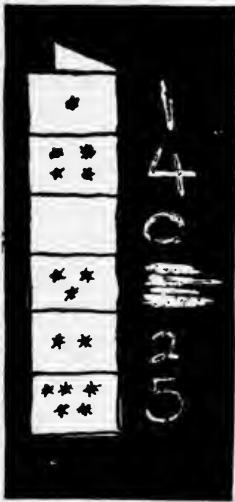
Now turn the game over, and make the other side with a red crayon and red stickers, as in the picture showing the other side. When you play use sometimes the red side and sometimes the blue side of your game.

Cut some strips of paper the size to cover up all the digits. They will be one foot long and three inches wide. |—————(3 inches)—————|—————|

Fasten one or more of these papers to your game with paper clips to cover up the digits while you write. Now you are ready to play. Get a crayon or pencil with which you can write large.

Look at the first group of stickers. On the paper beside it, write the digit which tells how many there are. Then look at the next group and do the same. When you have written down a digit by each group, take off your paper and look to see how many you have Just Right. Put that number down in your score book and try the other side. If you played with the red side, try the blue side. See if you can get a better score this time. When you stop for this time, be sure to draw a ring around your best score. Better be sure you draw a picture of the game at the top of your page in the score

•	1
• • • •	4
	0
• • •	3
• •	
• • • • • •	



book so you will know this score is for this game. Perhaps you will do better still the next time you play.

If you have a blackboard you can use it to write on instead of the paper. Fold the game so as to hide the digits while you write. If the game begins to wear out where you fold it, put a piece of gummed linen tape over the fold.

Either way you use the game, be sure to rub out anything that isn't right. If you use the blackboard it is easy to rub off any digit that isn't Just Right.

If you use the paper, just turn your crayon over and rub the long way right over the wrong digit. You do not want to remember anything that is not right, so the quicker you rub it off the better it is.

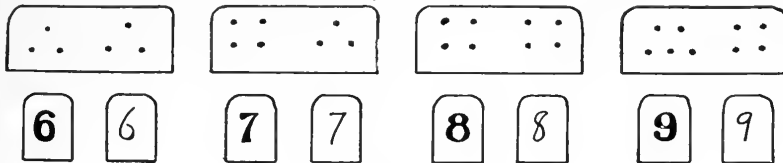
In the harder basket ball game you needed to write down as many

as

You remember the game on page 520

that helped you learn about the digits 1 2 3 4 5. You can make one like it for the larger numbers. Use the picture to help you. It will show you how many cards you need, and how to put the digits and stickers on them.

The big cards



The little cards

You can play the same kinds of games with these cards that you did with the easier numbers. Or you can make up new games to play with these harder numbers.

When you are ready to learn to write these digits, you can make a writing game for 6 7 8 9 like the one you made for 1 2 3 4 5. You will find the digits on page 4 of your Work Book.

WHAT HAVE YOU LEARNED?

Can you measure off one foot? Two feet? Three feet? How many feet can you measure?

Can you throw the ball into the basket from one foot? From two feet? From three feet? From how many feet can you throw the ball into the basket?

From how far can you get a Just Right score in the easier throwing game?

Can you keep score with digits in that game?

In the harder game, with the cards in the pocket, can you tell your score by looking at the digit cards or do you have to turn the cards over and count the stickers?

Do you know the digits well enough to keep score with them in the harder game?

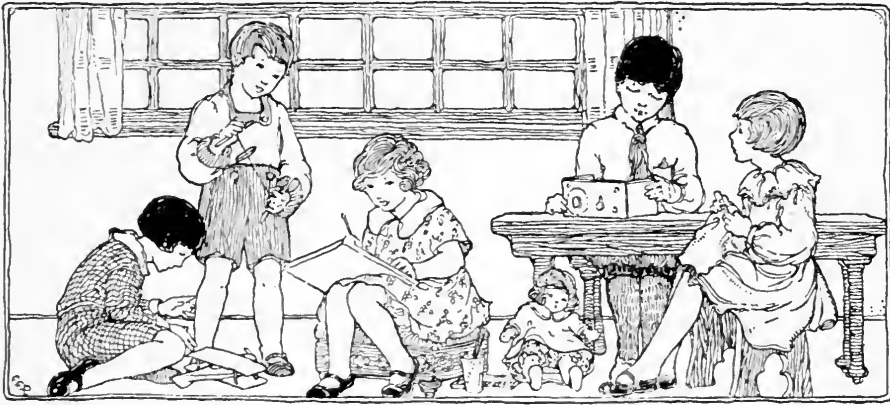
Can you write the digits for one, two, three, four and five? And can you write them for six, seven, eight and nine?

If any of the other children can't do as well as you, do you know how to help them? Can you show them how to throw better? How did you learn to throw better yourself? How did you learn to aim straight for the basket? Then you can show the other children what you have learned for yourself, can't you? And you learned what the digits say, and you learned how to write them, so you can help the other children learn these too. Anything you have learned yourself, you can help the others learn. Then you will all have fun together with your games.



THE NEXT HELPS TO LEARNING ARE ON PAGE 1287.

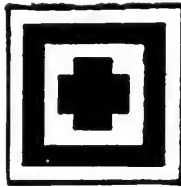
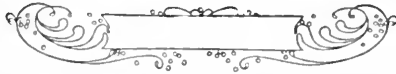
THINGS TO MAKE AND THINGS TO DO



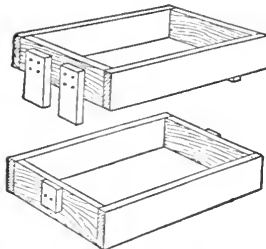
CAST YOUR OWN PAPER WEIGHTS

WOULD you like to cast paper weights or other simple articles from lead? If so, first make a wood pattern of the exact model (design and size) which you desire the article to be when cast. For example, if you decide to make a paper weight, the pattern should not be much over $1\frac{3}{4}$ inches square nor more than $\frac{3}{4}$ inch in thickness. (See two accompanying suggestions for simple designs.) The sides of the pattern are tapered, making the pattern slightly smaller at the top than at the bottom. This taper, or so-called draft, is provided in order that the pattern may be drawn more easily from the molding sand.

The molding box, or *flask*, is also made of wood. This consists of two rectangular box-like frames which are made exactly alike. Each of these should be made 7 inches long, 5 inches wide and 2 inches deep, inside dimensions. A bottom board, somewhat larger than the outside dimensions of the frames, is also necessary. The two frames are placed one above the other on the bottom board. As shown in the accompanying sketch, the upper frame is known as the *cope* and the lower one as the *drag*. In order that these two parts of the flask may come together exactly in the same position each time, two strips of wood about $\frac{1}{2}$ inch thick, 1 inch wide, and $2\frac{1}{2}$ inches long are nailed slightly over 1 inch apart on the outside of each end of the cope (upper box), so that the strips project down about 1 inch over the



Two pattern suggestions.



The molding box.

drag (lower box). Now nail a strip of wood of the same size to each end of the drag so that it will fit flush (without projecting) and will rest between the two similar projecting pieces on the cope (see drawing of the completed flask). The flask is then ready for the molding of your pattern.

Now you are ready to make the mold. First, place your pattern, large side down, near the middle of the board for your flask. Next, place the drag over and around it. Now fill the drag to the top with damp fine sand which should be tamped firmly. You are ready to place another board on top of the drag. This should be rubbed back and forth until an even, smooth surface of sand results.

The drag is then turned over, and the board is removed. The pattern is now exposed. The cope, or upper portion of the flask, is fitted to the drag. A layer of fine, dry sand, or *parting sand*, is then sprinkled over the exposed surface of damp sand in the drag. The cope is next filled with the damp molding sand and this is tamped firmly. A small tapered cylinder known as the *sprue pin* (a piece of chalk will do) is placed in the sand so that it projects but slightly up into the sand in the drag at a point near one corner of the pattern. Then pack the sand in the cope around this pin and withdraw it. This leaves a hole through the sand in the cope and slightly into the drag. Carefully remove the cope and make a small channel in the sand from the *sprue hole* to the

pattern. This channel is known as a *gate*. Now carefully withdraw the pattern by driving a sharpened nail or tack into it to serve as a handle. As you lift the pattern after tapping it lightly you will see why the pattern should not be larger at the base than at the top. The tapping will prevent breaking the sides of the mold left in the sand. To allow for escaping steam formed when the hot metal is poured into the damp sand mold, small holes, or *vents*, are made in the sand of the cope

by punching a small nail or pin nearly through the sand of the cope in several places. The cope is again fitted over the drag and the flask is ready.

The lead may be melted in an iron pot or ladle on the stove. It is then poured carefully into the sprue hole until it is filled to the top. After it has had time to cool, remove the casting from the flask and clean the sand from it. Finally break the projecting metal from the gate and file the casting to remove all rough places.

HOW TO FOLLOW A TRAIL

THERE are few pastimes that can be enjoyed in the country more interesting and more likely to develop our powers of observation than that of following a trail or tracking some person or animal from place to place. We learn to use our eyesight to the full extent, seeing things that others do not see; we get into the habit of noticing the smallest details, and we develop our brains by associating together things and ideas and signs.

We all know the story of the dervish traveling in the desert of Arabia, who astonished people by his apparently wonderful powers, but whose real power was simply that of the observing eye. A camel was lost, and the dervish, without seeing it, knew that it was blind in its right eye and lame in its left leg; that it had lost a front tooth, and was laden with honey on one side of its back, and wheat on the other. He knew that a camel had strayed, for he had seen its lonely track in the desert, without any signs of a man accompanying it; he knew it was blind in one eye, for it had cropped the grass on one side of the track only; he knew it must be lame in one foot because that footprint was less distinct than the others; he knew it had lost a tooth because, wherever it had grazed a small tuft of grass was left in the middle of every bite; and he knew from the busy little ants on one side of the path and the flies on the other side that wheat had been carried on one side and honey on the other.

This power is a very valuable one, and we may all, by constant practice, become more or less master in it. To develop it, no practice is better than that of trying to follow a trail. It may not be very easy at first, but we must not get discouraged but must persevere, and we shall then soon find that we can see what others cannot see, and the interest of it will grow, and we shall then be following trails most enthusiastically.

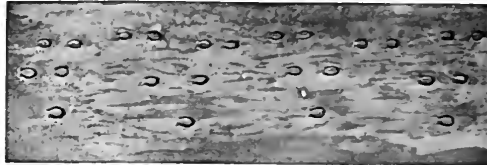
It is better, in starting, to select some place where footprints leave a more or less distinct impression. In winter, of course, the ideal conditions are found after a fall of snow, when the footprints both of birds and animals are clearly imprinted; and in summer we may take up a trail—that is, start following footprints—in a dusty or muddy road. A man puts the whole flat

of the foot on the ground, and the distance between the footprints will be slightly less than a yard. If he runs, the distance from print to print will be rather more than a yard, and the toes and front part of the foot will be more deeply impressed than in walking, especially if the ground is soft. There will also be a little of the ground kicked up by the toes each time the foot comes down, and this will be noticeable. Where different footprints clash, we must be careful to note any peculiarity in the one we are following—the order of hobnails, the size of rubber heels, and so on.

If we miss the footprints owing to the road's getting less dusty or snowy, we must not give up. We should carefully mark the place where the last footprint is visible, and then move round in front of it in a wide semicircle, seeking for some sign that will help us to continue the trail. If the sun is shin-

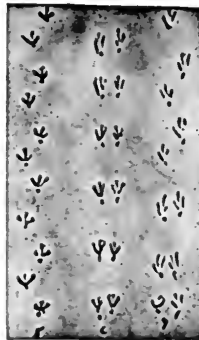
ing, it is always a very good plan to look along the surface of the road against the sun. Very often an indistinct trail can be seen in this way when it is invisible otherwise. This is most particularly the case with the track of a bicycle or motor car on a hard road, as these leave but very faint traces.

Should the footprints turn off across a field, it is often easy, by looking well ahead, to follow the trail by noticing the blades of grass slightly trodden down and pushed to right and left. In a wood, broken twigs are generally tell-tales, and will help to keep us on the right trail. The hoof-marks of a horse are perhaps the most distinct, and are easier to follow on a road than the footprints of a man, for the animal, being so much heavier, leaves a far deeper impression on the earth. The first picture on this page gives us an illustration of how the hoofprints appear of a walking, a trotting and a galloping horse. The footprints of birds and of animals like cats and dogs are very interesting. It is possible for us to know the character and habits of a bird from the impression of its feet. If the footprints are one in front of another, the bird walks and is a ground bird; if the prints are side by side, then it hops and is a tree bird; and if, in a single trail, the prints are sometimes of one kind and sometimes of another, the bird lives partly in trees and partly on the ground. The second picture shows very clearly how the three kinds of tracks appear.



A HORSE'S HOOFPRIINTS

First line, walking; second, trotting; third, galloping.



BIRD TRACKS

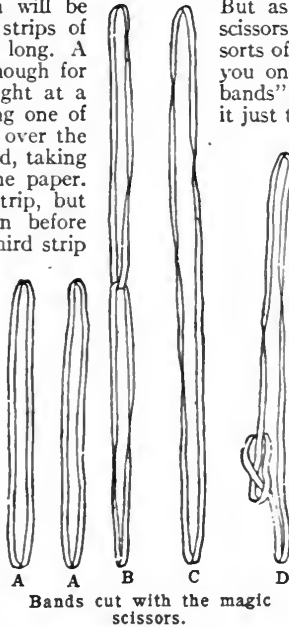
First row, a ground bird; second row, a tree bird; third row, a bird that lives partly on the ground and partly in trees.

THE BOY CONJURER'S MAGIC SCISSORS

THE trick we are going to describe is more usually known as "The Afghan Bands," but the title of "The Magic Scissors" is better, as it tends to persuade the spectators that the secret lies in the scissors used, though, as a matter of fact, they are quite an ordinary pair.

A little preliminary preparation will be necessary, as follows. Take four strips of stout inch-wide paper, each 6 feet long. A coil of suitable paper, in length enough for several performances, may be bought at a stationer's for a few cents. Taking one of these strips, we paste the one end over the other so as to make an endless band, taking care, in this case, not to twist the paper. We do the same with a second strip, but give one of the ends a half-turn before joining them. In the case of the third strip we must give it a complete turn, and in that of the fourth a turn and a half. The bands so prepared we will call respectively numbers 1, 2, 3 and 4. To help us to distinguish them in use, we may, if we please, mark the last three with two, three and four little dots or pinpricks respectively.

When about to show the trick, we come forward with the four bands hanging in regular order over one arm, and lay them on a table or across the back of a chair. We remark that we are about to exhibit a very curious experiment with these pieces of paper. "Experiment" is a more imposing word than "trick." We take band number 1, and with a pair of scissors snip a small hole midway anywhere in its breadth, after which we proceed to divide it into two parts by cutting onward throughout the length of the paper. The bands then appear like those marked *A* in the picture.



"Nothing very remarkable about that," we remark. "Just what you would expect, isn't it? But now I am going to show you something you would not expect. It's all done by virtue of these scissors. You don't notice anything particular about them? No, I didn't suppose you would."

But as a matter of fact, these are magic scissors; and, naturally, they produce all sorts of magical results. I am going to show you one of them. I take another of these bands" [here we take number 3], "and cut it just the same as before; but, you see, the result is quite different. We have again two separate bands, but the one is linked within the other."

The result is two bands, as before, but one of them is linked within the other, as seen at *B*.

"Now I will show you a still more surprising result. I take another band" [here we take number 2], "and cut this one also; but the result is again different." The band is now converted into one of double the original length, and appears as shown at *C*.

"And now for the most surprising effect of all. This time I shall not only make the paper band increase in length like the last one, but the magic scissors will tie a magic knot upon it. Please notice that I do nothing to produce the result. It's all done by the magic scissors." The last paper band now appears as shown in *D* in the figure.

The frequent reference to the scissors diverts attention from the minute difference between the four bands. The reason, by the way, for making them so large is that the necessary twists become less noticeable. Pasting can be done in front of the audience and no one will notice the turns.

HOW TO BLOW A BRICK OVER

SUPPOSE that we put a brick on the table and make it stand up on end; then, simply by using our breath we try to blow it over. Of course, we shall fail. The idea of blowing a brick over seems ridiculous. But, after all, it may not be so ridiculous as it seems. Indeed, there is a way by which we can make a brick fall over simply by blowing with the mouth. All we have to do is to procure a paper bag of fairly large size, such as fruit-sellers and bakers use to put things in; then we set the brick, end up, on the bag near the bottom end, and, after gathering the mouth of the bag together in one hand, we blow into it sharply, as is shown in

the picture, when the brick will be blown over on its side. Of course, anything else of convenient



How the brick is blown over.

shape, such as a large, heavy book, can be blown over in the same way.

We can mystify our friends by placing the brick upon the table and then talking of the wonderful power of the wind, telling of the enormous damage it does in a storm. From this we should lead up gently to the power of the lungs, and then announce that it is possible to blow over the brick upon the table. Our friends will naturally doubt this fact; but we must persuade them to try. When they have tried and failed, we just take a paper bag and show how it is done.

HOW TO CARE FOR GOLDFISH

OF all the pets, these golden fishes are likely to suffer most from neglect. They have no way of calling attention to their troubles except by hanging like tassels from the surface, where the air contains most oxygen, their sides heaving with the efforts of the gills, while the fish pant loudly, poking their noses quite out of water. Children forget to change the water, or to feed them, and are surprised when they find them floating upside down some morning, quite dead.

Among the most common causes of death are too little water and too small quarters, and too much sun also. This explains why picturesque globes should be avoided, or at any rate kept out of strong sunshine, for the curved sides collect the sun's rays and fairly scald the helpless fish. An oblong tank, made of one piece of glass, is easy to handle when empty, cannot leak, allows one to see the fish clearly, and does not break unless roughly handled. One holding about 3 gallons is of a handy size in which several fishes two inches long may have swimming room. Other aquaria, made of plain pieces of glass on at least two sides, fastened together with wood or metal at the corners, are not so easily handled and are apt to leak. The cement used must be carefully chosen, or when dissolved by the water it will poison the fish.

Whatever may be the form of tank chosen, it must be absolutely clean, and every trace of soap rinsed away. The carpet of sand also should be thoroughly washed and should not be that from the seashore, which is hard to rid of salt, but from a bank or a fresh-water stream. A little soil, also cleaned, may be used if well covered with sand, but is scarcely necessary, as the aquatic plants which we are going to insert need nothing but water.

These plants, growing in sunshine, exhale oxygen. In warm weather one can often see the leaves and stems beaded with silvery drops of gas which continually disengage themselves, and rise to explode near the surface. This oxygen, freed in the water, is absorbed by the blood of the fish as it flows through the gills. The carbon dioxide which is thrown out by the fish is essential to the growth of the plants, which seize upon it throughout their whole surface, assimilate the gas, and decompose it, extracting the carbon, rejecting the oxygen. This is done by the green parts of the plant containing chlorophyll, rendered active by light, and most so by sunshine. Tiny pores, or stomata, allow the rejected oxygen to escape from the cellular tissue, to be captured by the fish, as we have seen, thus completing the circle of usefulness.

Given plenty of plants to furnish oxygen for the animals; enough water to store it in (about 1 gallon for each fish); enough animal life to void carbon dioxide to supply the plants; and with sunlight to act as motive power, one can readily see that the water in the tank should remain in perfect condition and the whole affair be "balanced," as in a natural pond.

Aquatic plants may be bought from florists or dragged from brooks and ponds. The water from which they are taken must be pure, not containing sewage or dead fish, for deadly poisons may be carried in this way. Several kinds are suitable for aerating the water. A common one is the water-thyme, or *Anacharis*, a long weed with whorls of small simple leaves, growing rapidly. Frail horn-

worts, with thread-like foliage, stream down the currents, and skeleton-like *Characæ* lie in quiet eddies. Small pond-weeds, the tiny duckweeds, which float in a green scum on ponds, the long narrow-leaved tape-grass that swimmers dread, but which is one of the best air-giving plants a tank can have, and, in fact, any plant found growing in a stream will add beauty and profit to the tiny pond we are building.

While we are searching for plants we may also look up some snails. Generally some will be found in shallow quiet streams or even ditches, crawling on stones or grasses. Their shells are very fragile and must be fingered gently, and they must immediately be put into a pail or jar of water. The plants will do better, too, if they can be dropped into water. If they are not wrapped up, at least, they will dry into strings.

Plenty of snails should be taken (or if none can be found, some pretty round fellows can be bought of the fish dealers), for fish like a change of diet and will probably drag the snails out of the wide doors of their shell-homes and eat them. They are very necessary, for they clean up all sorts of minute plants and animals in our artificial pond, just as they do in the real one. We shall see them painstakingly wiping off the scum on the glass sides of the tank as they crawl over them with slow-dragging "feet," working their rasping tongues at the same time. They will also lay eggs in masses of jelly, but if the fish find them out, none of the tiny snails will escape.

When all this plunder has been carried home it



Water-thyme (*Philotria canadensis*).

should be put into water with a hint of salt, and allowed to soak for a while, then rinsed. The cleaned sand is placed in the bottom of the tank, and some of the biggest plants are anchored in it along one side. This will be the back of the aquarium—a background for the golden captives. Little pebbles and smaller plants may also be put

in, leaving a clear playground for the fish; then some water may be added with a sprinkling-pot. We then see how much air is forced under the water in this way. The plants will float out and we can rearrange them if we like, for they are more easily managed than when they fell over limply. Finally the tank—which, by the way, should be in



A little pond-weed.

the position where it is to stay, the best place being in an eastern window not too close to the glass for fear of frost in winter, and where the morning sun can cover it for a few hours—may be filled with water. It is then too heavy to move.

The snails can now be slipped in and the whole thing left for a few days. The early morning sun will start the plants growing, bubbles will rise to the surface, and soon we can put in the fish themselves. If the tank cannot be in an eastern window a southern one is probably the best; although during the hot hours in summer the sunshine must be cut off or the fish will faint and perhaps die. In fact, goldfish stand cold much better than they do heat, and the best time to start an aquarium is in the fall. Oxygen seems to escape more quickly in summer than in winter, but of course the plants will not grow so well when the sun is faint.

Although, if we are successful, we shall not need to change the water in this "balanced" tank, we shall want to clean up the refuse that collects at the bottom of the tank. This is best done with a siphon, or long tube, one end of which is in the water while the other hangs lower. We suck the air out of this latter end and the water rushes in to take its place, and keeps running as long as the two ends remain the same or until something fills the tube. The lower end must be so placed that the stream through it will fall into a dish. A little experience will enable us to steer the end that is under water over the soft heaps of dead foliage and rejected food that lie in corners and hollows behind plants, especially in the morning before the fish have stirred them up. It is amazing to see how quickly this refuse disappears into the tube and how easily the sand can be left in the tank (if the tube is not more than $\frac{1}{4}$ inch wide). We must be careful to avoid pulling up the plants, however, or jerking innocent snails out of their shells. The siphon's current is surprisingly strong, and would doubtless pull out a fish's eye, or injure

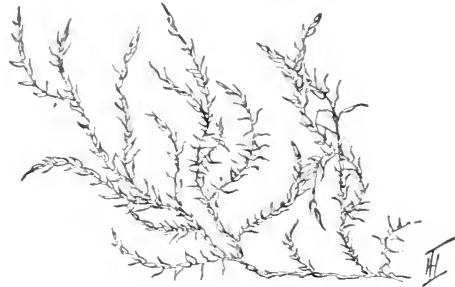
its tail, so that the fish must be carefully avoided. They, fortunately, usually scurry away when they first feel the tugging water at their fins.

So much water is pulled out by the suction that the amount left in the aquarium is naturally reduced, and one may wipe clean the exposed glass, before replenishing it. In this way the water is really constantly changed, without disturbing either plants or fishes. In summer, nevertheless, the water should be still more frequently aerated, by lifting it out in handfuls and dropping it back in splashes. Warm water parts with its air more easily than cold water does, and the fish are grateful for the air absorbed by the fountain-like spray.

When handling goldfish, it is well to remember that their scales are a valuable protection for them, and that a weak spot in their armor may mean a chance for a deadly fungus to insert itself. The slime oozing out of its skin further protects a fish from injury, and, if possible, it should not be rubbed off. A little scoop-net is generally used in shops for removing the fish from large aquaria, but I have found the hand to be the safest instrument, especially for the fragile-finned varieties.

There is an insidious fungus disease flourishing on dying fishes which attacks weak or wounded fish and gradually destroys them. It is this fungus which we are endeavoring to keep out when we scrub everything so vigorously, and which we dread when bringing in new fish or plants. Such should really be quarantined. The disease manifests itself by pale patches on the fish's scales, looking rather furry, and it sometimes covers the eyes with films, or eats away the fins and tail. If this horrid disease appears in the aquarium, everything but the fish must be thrown away, and they must be slid into a shallow bath of salt water—1 teaspoonful of salt to a gallon of water. The snails, too, if one wishes to save them, must go with the fish, and there all will have to stay until they are clean again or die, which is more probable. The tank itself will have to be scoured anew. It is best to buy fish from reliable dealers only so as to avoid getting this disease, if possible.

There are many lovely varieties of goldfish, some having long and broad filmy tails that mermaids must covet, and it seems better to keep



A moss-like water weed.

them in a tank by themselves. For one reason, they feed chiefly on vegetable food, although many of the prepared foods contain insects or their eggs, and I suspect some of them also contain crushed dog-biscuit. Breadcrumbs are often fed to them, but are likely to melt in the water and render it unhealthful. In fact, we must be very

careful to give them only tiny portions of food, and once a day is often enough; for they do not like left-over food, and it may foul the water when it rots behind the plants.

When the sun starts the plants growing in



Tape-grass (*Vallisneria spiralis*).

spring, we may find the water becoming green and thick. This is because millions of tiny water-plants too small to be seen without a glass are also growing there. They are really a sign that the water is pure, but the water does not look nice,

and the fish seem to have difficulty in swimming and become scarcely visible. Although they probably like their green shadowy home, we do not, and therefore we shall take out more water than usual when we clean up, and put back plenty of it, cold and clear. Generally the green gradually disappears, especially if we shade the tank during the heat of the day. At any rate, the water will clear in the fall. So long as the fish are swimming quietly around, the plants are growing nicely, and no bad odor arises from the water we may assume that everything is all right and leave the fish and tank alone. They will do much better if the tank is never touched except for the sake of cleanliness.

Sometimes we find that we have specimens of both sexes of fishes in our tank, and rarely, if conditions are to their liking, the female will lay eggs. These are globular and translucent, and catch like seed-pearls on all the plants. The male, who is never so gorgeously tinted as at this time, also wears white furry spots, and throws out a milky fluid, for the purpose of fertilizing the eggs. This "milt," however, sadly fouls the water, so that after the egg-laying is finished, in a day or two the tank must be emptied and refilled. If we want to raise little goldfish, we must quickly take the eggs out on their sprays of water-weeds, and establish them in a little aquarium by themselves, for the parents otherwise will nose them out and eat them up, precisely as they do the egg-masses that snails patiently deposit on the tank-walls. If we keep the little tank and its plants where it will get plenty of sunshine in the morning, but not so much as to overheat the water, we may find some queer little squirming forms, all eyes, wriggling about. They will snap at the minute bits of hard-boiled egg-yolk, crushed fine, with which we feed them, but so much will be wasted that the water must be changed every day to get rid of the decaying food. We must be careful that the fresh water is no colder than that taken out. If everything goes well, we may raise some funny little finny creatures which will eventually eat their parents' food and grow to their parents' size. And we can learn a lot about them.

A FLORAL BAROMETER

INSTEAD of making artificial flowers for show only, we can turn the art to account in a practical fashion, and make a bouquet of paper flowers that will tell us what the weather is going to be. So let us make some flowers out of pink paper, and some others out of blue paper. Any kind of flowers will do, so long as we use these two colors. We can make either a big or a small bouquet.

Now we purchase from a druggist a few cents' worth of chlorid of cobalt and dissolve it in water. When it is dissolved, we dip the flowers into the solution we have made; then hang them up to dry. If the solution is weak, we may dip them in a few times, letting them dry before every repetition of the bath. That is all we need. The floral barometer is ready for its work. When the weather is going to be damp the flowers made of pink paper will remain pink; but when it is going to be dry they will change into a purple color. Also, the flowers made from blue paper will remain blue when the weather is going to be wet, but when it is going to be dry they will turn to green. This

floral barometer is fairly reliable, and is more reliable than many expensive instruments to foretell the weather.

The paper bouquet, when coated with the solution of chlorid of cobalt as we have described becomes what is called by scientific men a *hygrometer*, which means measurer of moisture, and which comes from two Greek words—*hygros*, moist; and *metros*, measure. A bit of seaweed fresh from the sea forms a very good hygrometer. This is crisp and dry in warm weather, and moist and clammy in wet weather. This is caused by the salt that remains on it; the salt takes in moisture from the air when the air is moist, and, when the air is dry, so is the seaweed and the salt. If our senses were keen enough we could tell when the air is moist or dry, but our senses are not nearly keen enough to detect little changes, and careful students of chemistry and of nature have found out that the effect upon other objects, such as salt seaweed, is much greater than it is upon people, so that by studying seaweed and other things we can tell what changes the air is undergoing.

GAMES TO BE PLAYED OUT OF DOORS

THESE games are to be played out of doors, and they have this great advantage, that nobody need stand still, but that all the players can take part in them at the same time.

ROUND TAG

IN this game, which is sometimes called "Tierce," "stations," or "homes," should be marked out seven or eight paces apart, but in such a way as to form one large circle. At one of these stations three players stand, one in front of the other, while at all the rest only two stand, also one in front of the other. Thus, if there are fourteen players, there will be only six stations—one occupied by three players, five by two, the remaining player taking the part of *it*.

To begin the game, *it* must stand at the opposite side of the circle to that at which the three are stationed. Then he runs toward them, his object being to touch the *outside* boy. This boy at once tries to escape, but is safe from being touched only when he succeeds in placing himself in *front* of any other couple in the circle. Directly this is done, of course it makes three at that station, and the player at the back must escape in turn or he will be touched, in which case he has to be *it*, and the game starts again.

TOUCH, OR TAG

ONE player is counted out from the rest as *it*. The others then scatter about the field, while *it* does his best to touch them. The one touched takes his place.

Sometimes "touchwood" is allowed, and that means that any player who has his or her hand against wood, such as a tree, a fence, or a gate, cannot be touched until the hand is taken off again. It is a useful part of the game when we get out of breath for a minute.

In "crosstouch" any player who runs between *it* and the person he is chasing makes that person free, and the offending player must be chased instead. The oftener this is repeated, the livelier the game will be.

FILLING THE GAP

IN this game all the players but one form a circle by holding hands, and the larger the circle is, the better the fun. The player left out walks around and around the outside of the circle, and presently touches someone on the back. Directly he has done this he starts to run round the circle, while the boy he has touched does the same, only he runs in the opposite direction, thus leaving a gap, of course, where he stood. The game is to see who can reach this gap first, and the one who does so fills it. The other walks around and touches someone else, and so the game goes on.

I SPY

THE players divide into two parties. One party goes away and hides, the other stays "at home" with closed eyes. Presently they call out: "Coming once, coming twice, coming thrice," and if no one answers: "Not ready," they begin their search. When any searcher catches a glimpse of a hider, he or she calls out: "I spy——" giving the name of the person found and the place of hiding. At the cry the one discovered leaves his place, and does his best to touch the seeker before

he can get home. Only seekers who succeed in getting safely back may go out again to look. Keen eyes and swift feet are necessary for all searchers, or they will have little chance of spying a hider and reaching home before he bounds out of his den. If the hiders fail to catch half the number of those who seek them, they must take their turn in home. This is a livelier game than hide-and-seek, though it is something like it.

FLAGS

A LONG straight line is chalked on the grass, and the party of players is divided into two equal numbers, or sides. Each side then goes into its own "country," the line stretching between them. Every player must lay down on the grass, a few yards inside his line, a handkerchief, a cap or a scarf. These are the "flags." At a given signal one side rushes across the line to try to capture the enemy's flags. Those who succeed must be allowed to return to their country, but any caught before securing a flag are prisoners. It is then the other side's turn to cross the line, and their prisoners, if any, must help to capture the lost flags and those belonging to the enemy. No player must take more than one flag at each attack, and the side that is first to lose its flags is defeated.

WARNING

A LINE is drawn across the grass, and a player takes his place behind it, where he is at "home" and safe. Presently, with both hands clasped in front of him, he calls out: "Warning! Warning!" and, still with clasped hands, jumps across the line and chases the other players. If he can touch one of them, the one touched runs back to home with him, and they start out again together, hand in hand. The game becomes more exciting as more players are touched, for each one adds to the chain that comes out from home to make prisoners. But on no account must those who form this chain unclasp their hands, or they can be caught and made to release their captive.

FOLLOW MY LEADER

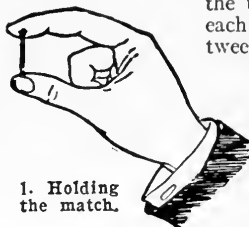
"MY LEADER" must be daring, or there will not be much fun in following him. The players take places one behind the other, the more the merrier. Away goes the leader through the most difficult places he can think of, jumping over ditches, climbing steep banks, and running over rough ground. If any follower fails to do the task set by the leader, he must retire to the back of the row, and when the fun is over, it is sometimes found that the one who started last has worked his way to the second place, and thus comes next to the leader.

BOUNCE ABOUT

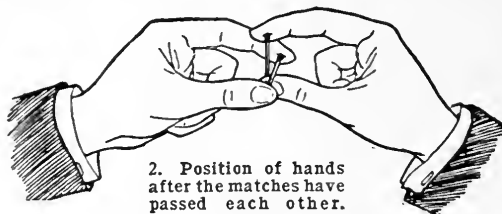
TWO players, with two marbles, play this game. The larger the marbles the better. One boy throws his marble down. If his companion can hit it with his own, he wins 10 marks, and has the right to try again, aiming from the spot at which his marble stops. He may keep on till he misses, when the other player takes a turn. A certain number should be fixed upon, such as 100, and the player whose marks reach this first will be the winner. Sometimes this game is played with smooth pebbles.

PULLING ONE STICK THROUGH ANOTHER

IN this trick the performer takes a burnt match or small stick in each hand, held lengthwise between forefinger and thumb, as in picture 1. He brings his hands together, holding them so that the matches are crosswise to each other. Strange to say, instead of clashing the one against the other when they meet, the one passes right through the other, and the two hands are thereby linked together, each match being now *within* the space inclosed by the match, thumb and forefinger of the opposite hand. It would seem as though they could not possibly be again separated without dropping one or other of the matches. And yet the performer, by virtue of his magic power, disengages them with the greatest ease, drawing the hands freely apart, quickly or slowly, as may be desired, and re-engages them in like manner, the matches remaining throughout undisturbed between finger and thumb as at first. The trick depends partly upon the kind of match used, and partly upon a little cleverness, which, though by no means difficult, must be practiced diligently before



1. Holding the match.



2. Position of hands after the matches have passed each other.

the operator ventures to use it in public. This, by the way, applies to all conjuring tricks. The matches used are those known as phosphorus matches, which we ordinarily use in the house. These are not of the "safety" kind, but have large red heads, into the composition of which a good deal of *glue* enters. The performer prepares for the trick by privately moistening the tip of each forefinger; and, in taking the matches between finger and thumb, he places the "head" end next the moistened forefinger. A gentle pressure makes the match adhere to the finger strongly enough to carry its own weight. When he brings the hands together, he does so in such a manner that the match in the left hand comes into contact with that in the right close to the lower, or non-adhesive, end. A slight relaxation of the pressure of the right forefinger lifts the match in that hand away from the thumb in a very minute degree, and allows the match in the opposite hand to pass through the gap thus created. As soon as it has passed, the thumb closes on the end of the match as before. The matches are separated in like manner.

DOLLS MADE FROM CLOTHESPINS

THE common round clothespin is a convenient article to adapt so as to make tiny dolls or figures. The split end serves for legs, and the body and head are all there ready made, so that the work is simple and easy. Then, clothespins are cheap, so that we can use a good many of them without incurring much expense, and that fact is an important consideration if we have not much pocket-money. If we prefer it, instead of making dolls we may make a small army of soldiers. A clothespin will not stand steadily on its legs, so we must provide supports by which our dolls or soldiers may stand upright. These supports may be small pieces of cardboard, or thin wood or cord, about the size of a quarter, as seen in the pictures. A tack or two driven through the support into the bottom of the legs will serve the purpose.

Then there are many ways in which we can decorate or dress our clothespins so as to make them look realistic. Black ink is the plainest form of decoration we can apply, and the first two figures show clothespins finished in this way. One

is a circus clown, and the other is a negro with a fool's cap which is made from a piece of paper twisted into shape. If we wish to give color to some of our dolls, we can easily do so by using our box of paints, and there is room for a display of skill even in such a simple thing as this. If we begin to put dresses on our clothespins, tissue-paper is at once the cheapest and easiest material to work. In the picture the last two figures represent a man and a woman clothespin dressed in tissue-paper. They look quite handsome if the work is neatly done. The man has a tall hat made from a cork stuck upon the head. There are many other varieties of dress that will suggest themselves as we

experiment with the pins, and it is always better to devise different styles than to copy something exactly as before. On page 898 we see how to make a pair of wrestlers from two clothespins, and, if we have not yet done this, we can do so after we have made a few trials with simpler figures to get used to the work.

THE NEXT THINGS TO MAKE AND TO DO ARE ON PAGE 1149.



Four little dolls made from clothespins.



Sea scorpions of the Silurian Period.

THE WORLD IN THE SILURIAN PERIOD

WHAT is known as the Silurian Period in the development of life and the building of the world's foundations is illustrated in these pages of our pictured geology. The lower picture on page 1033 gives a section of the Silurian limestone rocks, in which the fossil remains of the chief forms of life of that time are shown. Our artist shows them very much as they are found at the present day, but of course much larger. In the upper picture on page 1033 is shown an imaginary scene on the seashore—an impression of what the coasts of North America were like millions of years ago.

In those Silurian times there was very little dry land in North America. An island-like area from the Pacific eastward to the Grand Canyon in Arizona, and an Appalachian land on the east, formed the boundaries of a great sea which covered the rest of what is now land. Most of this sea was quite deep, and though at first shallower in the east, it gradually deepened there through Ordovician, or Lower Silurian, times.

Around the barren coasts of Silurian times—for there were no trees or flowers, only mosses and ferns—strange forms of life multiplied enormously. Trilobites, which we saw in the Cambrian Period, still dominated in the Si-

lurian Period. But in the meantime the small shrimp-like type of crustaceans, the phyllopods, had increased enormously, and some of this same family developed into great creatures resembling lobsters. These phyllopods were destined to become rulers of these early seas. The soft-bodied molluscs—creatures like the whelk, winkle, oyster or mussel, of which there were vast numbers—found it best to keep within their shells, when the pterygotus, the great lobster-like crustacean, was about. Some of the fossils of these lobsters have been found, showing that they reached a length of seven feet.

It is easy to understand that many of the smaller trilobites began to have a hard time with such armed monsters to contend with. Some of these persecuted creatures learned how to roll themselves into a ball with their hard shells outside; others, in the course of their many, many years of struggling for existence, changed somewhat from the general form of trilobites.

Active movements were necessary to their safety, and while they retained the broad and hard-cased head, they acquired active and slender bodies. Moreover, they increased their flexibility by gradually doing away with the three-lobed shell of their bodies.

which they were obliged to shed periodically in order to grow, and they acquired permanent bony plates which expanded as they grew. Slowly some of them developed a gristly centre of cartilage, extending through the middle of their soft bodies from head to tail. This was divided into numbers of joints, with a nerve running through the whole straight from the brain, which enabled these creatures to move instantly, twisting and turning in every direction with the greatest speed, so that nothing could catch them. Equipped with all these advantages, they began to multiply greatly.

THE FIRST CREATURES WITH A BACKBONE IN THE WORLD

In this period also we find the first fishes, queer-looking little creatures. This was a stupendous event, and a great step upward in animal development, for it was the beginning of creatures with a backbone. We must be sure to remember that the Silurian Period is remarkable chiefly for the appearance of the Vertebrata—backboned animals—and fishes.

There was an immense number of the lower forms of life, but nearly all, as far as is known, were in the sea. Some, like those queer animals called crinoids and cystideans, grew stalks and spent all or most of their sleepy lives attached to a rock. Others founded colonies and built up round themselves houses of lime which we now know as coral. Some of this coral lime, mixed with the lime of other fossils, is found to-day in the shape of miles and miles of solid limestone rock.

Careful measurement has shown that Silurian rock at least 26,000 feet thick still exists, and forms part of the foundations of Great Britain.

The Silurian rocks of the Interior Sea were limestones and dolomites, but most of the eastern rocks were sandstones, pudding stones and mudstones, formed in shallower waters near the coast, river mouths and beaches. The limestones always represent areas that were once the bottom of a deep sea.

THE LIMESTONE THAT WAS MADE AT THE BOTTOM OF THE SEA

The Silurian rocks come to the surface over a large part of the United States and Canada, and will be found just beneath the mold, sand or made-up ground, over the areas mentioned below. Their depths will vary, as a rule, between a few inches and two or three feet, except along river

banks and the bottom of valleys and similar places where rain-washings have collected from the hills.

Silurian and Ordovician rocks border the older Cambrian and Archæan layers of the eastern states, running in long belts from northern Maine along the Appalachians to Alabama, notably forming the beautiful valley of the Shenandoah, and the crests of many ridges, such as Kittatinny Mountain. A broad area of the older and younger layers appears in Ohio, Kentucky and Tennessee, also in Missouri, in the Buck Hills and in Nevada. Silurian rocks cause the beautiful falls and gorge of the Niagara River. In Canada the Silurian rocks are to be found in the province of Quebec, in New Brunswick and in Nova Scotia. The upper Silurian group occurs in Ontario in the Niagara district. Behind the water flowing over Niagara Falls one may see Silurian rocks exposed. In many other places small areas are exposed.

Geologists divide these layers of rocks into Upper and Lower Silurian. The lower, commonly called Ordovician, exhibits an earlier and simpler type of life. Their immense depth of 26,000 feet represents only what is left of the rocks formed during the long Silurian Period. How much more was laid down in this great sea we cannot tell.

MANY, MANY YEARS REQUIRED TO BUILD UP THE SILURIAN ROCKS

It is very difficult to estimate the length of time the Silurian rocks were forming. It is much easier to calculate the least time to produce a rock formation than the whole time. It might be possible to estimate the minimum time it took to build a high wall, knowing the number of successive layers of bricks, knowing also the rate at which the bricklayers built, but if several layers were subsequently removed from the top by wind and rain, and the rest were very much bent and twisted, calculation of the time actually taken would be out of the question.

The rocks laid down in the seas during this double period were chiefly limestones and sandstones, and are of great value to-day. They are quarried for building stone, for road-making and for making lime and cement. The marble of Vermont is largely Ordovician, while the salt beds of Ontario, Ohio and New York were deposited during the Upper Silurian.

THE NEXT STORY OF THE EARTH IS ON PAGE 1175.

IMAGINARY VIEW OF THE SILURIAN



A view of the world in the Silurian Period, with a section through the sea and sea bed, showing the first fishes in the sea, and other sea creatures in the mud.



A section through the rocks of the Silurian, showing the fossils (greatly enlarged) in the rocky strata.

THE HEROINE OF LONGSTONE LIGHTHOUSE



The lighthouse on Farne Islands from which Grace Darling, one of the bravest girls that ever lived, rowed with her father, the keeper of the light, to rescue nine men and women from the steamer *Forfarshire*, tossed on the rocks and wrecked by stormy seas on the night of September 6, 1838.



In the morning, as soon as it was light, Grace Darling mounted the lighthouse tower with the telescope. On the rocks in the raging sea she saw the wreck. She launched the lighthouse boat, and, with her father rowed through the storm to where the nine people were in peril of their lives. It was a hard pull, but the rescuers were in time to bring the sufferers back in safety to the lighthouse.

The Book of GOLDEN DEEDS

WHAT THESE STORIES TELL US

WE read of many kinds of heroism in these stories. The first tells us of a girl who made her name ring through the world in a single day—Grace Darling, who faced an angry sea and risked her own life to save the lives of many who were perfect strangers to her. We read again of a boy who saved the whole of his family by bearing pain bravely. Another story tells us of a faithful Chinese servant who saved his mistress and her child from the hands of wicked men, and starved himself to give them food; still another tale is that of a merchant who saw a man drowning and jumped into the river to save him, then found that he was saving his own son.

THE HEROISM OF GRACE DARLING

A FAST rising storm overtook the steamer *Forfarshire* as she reached the open sea off Spurn Head on September 6, 1838, on her way from Hull to Dundee.

In the fairest weather this ship, with her leaky boilers, was none too safe, but as the storm gathered in fury, and she rolled and tossed amid the mountainous seas, her boilers were strained, and great rents were made in her sides, through which water poured and put out the fires, making the vessel unmanageable. The crew tried to use her sails, so as to keep the ship out at sea, but the sails were quickly blown to shreds. As night fell, the boat tossed and drifted in the dark at the mercy of the storm, and at midnight the great Farne light, off the Northumberland coast, was seen with its warning of terrible danger. For at this point the coast is set with rocks that rise from a depth of a hundred fathoms.

Upon these rocks the ship, with her terrified crew, was dashed and cut in two. The stern sank in deep water with over forty souls; while the bow, with nine sailors and passengers clinging to the wreck, was fast on the rocks, swept by the waves and buffeted by the storm.

It is easy to imagine the terror of those that clung there, waiting for the dawn and praying for help. As the dawn broke they could see, a mile away, the Longstone lighthouse, built on the outer island of the group, where a weather-beaten old sailor

named Darling tended the lamps, living with his wife and his daughter

Grace. They had not slept through the night, because of the waves that had been thundering upon the rocks and dashing over

the lantern high above the sea-level.

When it was light enough, Grace mounted the lighthouse tower with the telescope. Far away in the raging sea were the nine poor souls clinging to the wreck. Knowing full well that, with a rising tide and the storm still growing, they must perish, the brave girl determined to try to save them. Her father and mother tried to persuade her not to go out to what seemed certain death, but she said: "If father will not go with me, I will go alone." Seeing that she was so determined, her mother helped to launch the lighthouse boat, in which the brave girl and her brave father rowed toward the wreck and the men who were in such dire peril of their lives. Undaunted by danger, battling with the winds and the angry waters, the two at last reached the wreck, and brought the sufferers back in safety to the lighthouse.

The story of Grace Darling's heroism spread quickly through the country and through the world. Generous people sent money and presents to the brave girl, whom many people came long distances to see. But she lived only four years after this to enjoy her fame and good fortune, and when she died they laid her to sleep within sight of the scene of her golden deed.

THE MAN WHO SAVED HIS SON

A FRENCH merchant named Labat was taken ill in the early years of the last century, and retired to a beautiful country house on the banks of the river Adour. Here, one morning, his gaze was attracted by a rider struggling with a restive horse on the opposite bank. The old merchant, who was wearing a dressing-gown, peered across the distance, and watched the battle between man and horse with anxious eyes. Suddenly he was horrified to see the rider hurled violently from the back of the plunging horse, and thrown into the river.

The merchant never hesitated. He forgot his age, his illness, his comfortable house, his own safety, and, hurrying down, he dived in after the drowning stranger. Such is the call of humanity.

He was a good swimmer, but the heavily booted horseman was hard to save, and it was only after a terrible struggle that the merchant succeeded in bringing him safely to shore.

Then, with a cry which must have startled the morning echoes, the grand old merchant exclaimed fervently:

"Sacred Humanity, what do I not owe you? I have saved my son!"

THE SERVANT WHO TRIED TO SAVE HIS MISTRESS

ON a small island off Australia, inside the Great Barrier Reef, North Queensland, an Englishman was one day obliged to visit a distant town for supplies, leaving his wife and their baby in the care of their Chinese servant.

While he was away, the servant came in great alarm, saying that the natives, who were very fierce and cruel, had come from the mainland and were marching down the island toward their house. What could be done? There was no hiding-place on the little island, and the master had gone away in the only boat. The Chinese hastily launched a huge copper vessel used for cooking, helped

the woman and child into it, and, taking a jug of water and a little food, paddled away to an uninhabited islet three or four miles distant. From there they saw the natives destroy the little house.

As long as she had strength the woman kept a diary of events, writing how the Chinese made them as comfortable as possible, and how finally, after many days of denial, he went off by himself and hid in the bush, where later he was found, starved to death, wrapped in his old ragged quilt.

Alas! before help came, the mother and her babe died, too; and all were found, with the diary that told the story.

THE BOY WHO SAVED HIS FAMILY

ABOUT two hundred years ago the Huguenots, who were the Protestants of France, were being bitterly persecuted for their religious beliefs. In the village of Thorigne lived a weaver named Daniel Bonnett. He had a wife and three children, the youngest being a little boy of five years.

As they were Huguenots, suffering great hardships, they decided to leave France and go to America, where they would be free to worship God as they liked.

When all was ready they started off; but in order to get away safely they put their three children on the back of a donkey and covered them over with vegetables. Then they set off as though they were going to market; for if it had been known that they were leaving France they would have been stopped.

Not long after they had left the village, one of the soldiers saw them, and,

suspecting that they had hidden their children under the vegetables, he rode up and said with a sneer: "Going to market, are you? Then I will try if your carrots are tender." With that he drove his sword into the load on the donkey's back with all his might, but, hearing no sound, he thought he had made a mistake, and galloped off.

We can imagine the agony which the poor parents felt. They dared not stop to see what had happened, but had to go on until they were far away out of sight of everyone. When at last they took off the vegetables, they found that their little boy had been stabbed through the thigh. The little fellow looked up at them, and said with pride: "But I did not speak, mother," and then fainted.

Thanks to his courage, the family were able to escape across the sea, and to found a new home in a happier land.

AN APRONFUL OF GUNPOWDER

THIS story of Elizabeth Zane is one of those precious tales of the heroism of our great-grandmothers which we cannot forget. Her father was the leading man in his section of the Ohio wilderness and commanded the little fort built for defense against the British and their savage allies. Though there were no great battles after the surrender of Cornwallis in 1781, peace did not come to the West until years afterward.

It was an autumn day in the year 1782. Evening was slowly closing in about the little log fort. It had been attacked by Indians, and the handful of men and women within the palisades watched the descent of the sun with anxious hearts, for in the deepening shadows of the forest beyond the clearing the enemy was hiding, watching every movement of the besieged, and ready at any moment to rush in and overwhelm them. No one in the little fort knew what deviltry the night might bring forth.

Moreover, a terrible calamity had fallen upon the garrison. They were out of powder. The men, pacing restlessly about the stockade, glanced every now and then from their empty pouches to the little group of women and children that held all most dear to them in the world, and from that, out over the stockade to a little hut in the clearing. Then they swore softly to themselves.

Almost under the stockade walls in that little log hut there was an abundant supply of powder, which by some oversight had not been brought inside the fort. Two or three brave men were there, too, to defend the powder, but they were thirty yards away. In every inch of that distance loomed death from the hands of the watching savages.

The men gathered together to talk the situation over. At last one thing was decided. They must have a keg of powder—and at once! Several of the young men eagerly offered to get it; but from the little handful not one could well be spared from his post upon the stockade.

Suddenly a girl's crisp, clear voice broke in upon their conference. It was the young daughter of the commander, Elizabeth Zane, who spoke.

"I have heard you talking," she began decisively, "and I do not think any

of your plans are any good. I am going for the powder."

A murmur of quick protest broke from the men.

"No," they growled, "it's a man's deed."

"Yes," returned Elizabeth calmly, "but there isn't a man who can be spared. A woman will never be missed in the defense of the fort."

Zane had been regarding his daughter thoughtfully under knit shaggy brows.

"The girl is right," he said at last gruffly, in his effort to control his feeling. "Let her go."

Through the gathering shadows Elizabeth stole out of the stockade door. The anxious watchers behind the palisades saw the slim figure dart across the dusky clearing to the hut. For a moment the girl beat upon the door with white, uplifted hands. Then it was opened and she slipped within. Almost by a miracle she had reached the outpost without being discovered by the foe.

It seemed hours—though it could have been but a few minutes—before there were any signs of the door opening. Then it was pushed apart a little way and Elizabeth appeared. She seemed to be holding her checkered apron, full of something, gathered to her breast. Over the stubble field she came on flying feet. Suddenly the men in the fort gripped their useless muskets.

A wild, horrible whoop quivered through the night air. Elizabeth had been discovered. A rain of arrows and bullets flew about the little running figure, and some shrieking savages broke from the woods in full pursuit. Once the girl almost fell. Oh! why in God's name had they planted that field with corn in the springtime? No, she is up—her brave little feet carrying her on—the precious bundle still clasped to her breast. She has almost reached the stockade. Open the door—quick! Strong, swift arms gather her into the fort and slam the door—just in time, for a pelt-ing shower of bullets rattle upon the logs.

But who cares about bullets now? The fort is saved—for in that checkered apron gathered in Elizabeth's arms is the gunpowder that will enable them to foil the enemy and hold the fort.

THE NEXT STORY OF GOLDEN DEEDS IS ON PAGE 1355.



This statue of Abraham Lincoln, which is in the Lincoln Memorial at Washington, D. C., is the work of Daniel Chester French.

Photo, copyright, Harris & Ewing.

LINCOLN'S GETTYSBURG ADDRESS

Soon after the battle of Gettysburg, the field was dedicated as a national cemetery. On that occasion President Lincoln spoke the following words, which will endure forever as an expression of the spirit of the United States.

FOUR SCORE and seven years ago our fathers brought forth on this continent, a new nation, conceived in Liberty, and dedicated to the proposition that all men are created equal.

Now we are engaged in a great civil war; testing whether that nation, or any nation so conceived and so dedicated, can long endure. We are met on a great battle-field of that war. We have come to dedicate a portion of that field, as a final resting-place for those who here gave their lives that that nation might live. It is altogether fitting and proper that we should do this.

But, in a larger sense, we can not dedicate—we can not consecrate—we can not hallow—this ground. The brave men, living and dead, who struggled here have consecrated it, far above our poor power to add or detract. The world will little note, nor long remember what we say here, but it can never forget what they did here. It is for us the living, rather, to be dedicated here to the unfinished work which they who fought here have thus far so nobly advanced. It is rather for us to be here dedicated to the great task remaining before us—that from these honored dead we take increased devotion to that cause for which they gave the last full measure of devotion—that we here highly resolve that these dead shall not have died in vain—that this nation, under God, shall have a new birth of freedom—and that government of the people, by the people, for the people, shall not perish from the earth.

The Book of THE UNITED STATES



FIVE FAMOUS PRESIDENTS OF THE UNITED STATES

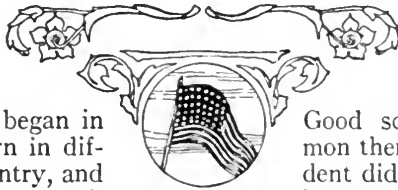
TWENTY-NINE

men have served as president of the United States since our government began in 1789. They were born in different parts of the country, and their early lives were also different. Some were poor boys who had hard work to gain knowledge; others were the sons of rich men who gave them every advantage of school, college and travel. Some were soldiers in their early life, while others served their country in civil offices. All of them tried to do what they thought was best for the country, though some succeeded better than others.

You will find something about every one of them in different places in our book, but here we shall tell you more of the lives of five of them. Every one of the five had great influence upon public affairs, and should always be remembered by patriotic young Americans.

GEORGE WASHINGTON, THE FATHER OF HIS COUNTRY

On February 22, 1732, in a simple Virginia homestead in Westmoreland County, Virginia, a boy was born who was to alter the history of a nation. The name of that boy was George Washington. His father died when the boy was eleven years of age, and



he spent much of his time at the home of his older brother, Lawrence.

Good schools were not common then, and the future president did not attend at all after he was sixteen years old. His

brother Lawrence, who was fourteen years his senior, had seen fighting abroad, and had great influence upon his younger brother, whom he dearly loved and to whom he gave his estate, Mount Vernon, by his will. There is a story that Lawrence secured for his brother a commission in the British navy, but that his mother's tears prevented him from accepting. We know that he visited the West Indies with his brother, who sought health there in vain.

When he was but sixteen, the real work of Washington's life began. He was placed in charge of the survey of the estate of Lord Fairfax in the Shenandoah Valley. With but one companion, another young lad by the name of George Fairfax, he started out on horseback to ride to Shenandoah Valley, a distance of one hundred miles through the forest. Upon their return to Mount Vernon, Lord Fairfax was so much pleased with Washington's work that he had him appointed a public surveyor. For the

next few years the young man's life was an exposed, yet a healthful one, spent largely among the Indians in the forests. He was gaining self-reliance and a knowledge of the country that was to stand him in good stead in the days to come.

There soon came to Washington an opportunity to prove his pluck and perseverance. For years there had been a dispute between the French and the English as to the rights of each nation to occupy the Ohio Valley. The French were invading the country that the English claimed belonged to them. It was decided to send a trusty messenger from Governor Dinwiddie, of Virginia, to the French commander to remonstrate with him for building forts upon English land. All eyes turned to young Washington, who was making a name for himself throughout the country. He willingly accepted the task. A journey of one thousand miles through a trackless wilderness in the dead of winter was an undertaking to cool the ardor of the most courageous; but Washington with a little party boldly plunged on through dark forests, over steep snow-bound mountains and swollen rivers, until the end of his journey was reached.

The French were very polite, but showed that they intended to stay where they were, and the little party turned homeward. The horses soon became too weak to stand, and leaving them behind, Washington pushed on ahead with a single companion—their packs strapped to their backs and their guns in their hands. Upon reaching the Alleghany River, which they had expected to cross on the ice, they found, to their dismay, that it was broken up and filled with whirling, grinding blocks of ice. With one hatchet between them Washington and his companion managed to build a rough raft. Desperately they struggled with the swirling current and the floating ice cakes. As they reached the middle of the stream, the raft suddenly heaved and Washington was hurled into the icy water. Instinctively he clutched a log, and by the greatest effort managed to reach a near-by island. Here the travelers tramped back and forth through the long darkness of night, their clothes stiffening to ice as the bitter wind searched them out.

When morning came, they crossed to the other shore, and from there they

hurried on to Williamsburg, then the capital of Virginia, to deliver to Governor Dinwiddie the letter from the French commander. This courage was characteristic of Washington's whole life. He never flinched when there was a hard task to be done. In the French and Indian War that followed, he served bravely and well until the end of 1758. The war in the South and West was over then, and his resignation was accepted. In 1759 he married an attractive young widow, Martha Custis, to whom he had lost his heart upon first sight. Years of married happiness were passed on his broad lands at Mount Vernon before the country again called him to the front.

After the French and Indian War the disputes with Great Britain grew more bitter, and Washington was chosen to both the First and the Second Continental Congress. After the battle of Lexington Congress determined that an army must be organized to defend the rights of the colonists. A leader was necessary. With one impulse the people turned to the man who had never failed his country or his friends in time of need. On June 15, 1775, Washington was unanimously elected commander-in-chief. On July 3, amid the shouting of the multitude and the roar of artillery, Washington took command of the men who had gathered around Boston.

These men had come from their farms at the news of trouble; they were without uniforms or camp equipment; their arms were their own rifles, and bullets which fitted the weapon of one man could not be used in that of his neighbor. They had not enlisted in an army; they had come to defend their country. It was Washington's task to make an army of this gathering and then to lead it in the battles which were to come.

The soldiers he commanded were brave and patriotic, but they were not disciplined. Yet they had to meet the deadly fire of the king's regulars, and it sorely tried their general's heart to see how dearly they must pay for their lack of experience and training as an army. Ammunition and firearms were scarce; food and clothing were almost unobtainable. During that winter of horrors at Valley Forge many of the soldiers went about their duties barefoot, leaving blood tracks behind them in the whiteness of the snow. The piteous, uncomplaining

WHERE REST TWO LEADERS OF MEN



National Photo.

At Mount Vernon, where he lived beside the Potomac River, George Washington, first of our presidents, is buried. There come the great of many lands to pay homage to his memory. And there many a humble admirer leaves a thought that is as true a tribute as the garlands from the noted of the earth.



Upon the heights beside the Hudson River, in New York, stands the tomb of General Grant, bearing high upon its façade his words, "Let us have peace." This, too, is a shrine toward which many travelers turn to show the honor they feel for a man who met a great need with perseverance and force and who is numbered among the leaders of men.

Photo. Ewing Galloway.

courage of these poor fellows wrung tears from the man who had said of the battle roar, "I heard the bullets whistle, and, believe me, there is something charming in the sound."

The American army, under its brave commander, spurred itself to remarkable deeds of endurance. Battlefields where defeat seemed inevitable were turned to victories under the generalship of this leader of men, until, with the aid of France, the war that had started out so hopelessly for the American colonists ended in the surrender of Cornwallis and a British army of over 7,000 soldiers. Soon America was free.

On December 28, 1783, Washington offered his resignation and retired once more to his home at Mount Vernon, but he was not to be allowed to remain in peaceful obscurity. He was chosen to preside over the convention which framed the Constitution. When the Constitution was adopted, a president was necessary. There was but one man who could fill the place. On April 30, 1789, Washington's inauguration took place. For eight years, two terms of office, he successfully guided the nation in ways of prosperity and peace; and then, refusing a third term, he again retired to his old home at Mount Vernon to enjoy the rest he so well deserved. One day when Washington had returned from a long ride around his plantation, he complained of a sore throat. The next day, December 14, 1799, the great man lay dying, his household gathered around his bed. The doctors were doing all in their power to prolong his life. With his usual dignified courtesy, he addressed them. "I feel I am going," he said quietly. "I thank you for your attentions, but I pray you to take no more trouble about me."

Washington was not the greatest general that ever lived. Those of us who admire him most do not say that. He was more than a great general. He was a great man. He was a good soldier, a wise ruler, a true friend and an honest, unselfish man. He loved his country and was willing to make any sacrifice for it.

THOMAS JEFFERSON, AUTHOR OF THE DECLARATION OF INDEPENDENCE

Although no man could ever take Washington's place in the hearts of the people, the third president of the United States, Thomas Jefferson, had many warm

friends and supporters, though he had more enemies than Washington. Born in 1743 near Charlottesville, Virginia, he received very little schooling as a boy, and became, like Washington, a surveyor, enduring the hardship of the pioneer life. He was so fond of books and learning that he prepared himself for college. Bashful, yet warm-hearted and eager for information, it was not surprising that Jefferson made many friends for himself in the College of William and Mary, at Williamsburg, Virginia. This college, as you may know, is next to Harvard in age.

He studied law and began to practice, but his chief interest was in farming. From his father he had a large tract of land and he bought more. In 1772 he married Martha Skelton, a charming young widow, who also had a great deal of land. All his life he was trying experiments in farming. He introduced better machinery, invented a plow, and brought many kinds of trees and plants from different countries to find if they would grow in the United States.

He was not to be allowed to remain on his plantations. Virginia and the nation had need of him. He served in the Virginia legislature, in the Continental Congress, where he wrote the Declaration of Independence, and as governor of Virginia. After the Revolution he served in Congress, and from 1784 to 1789 represented the country in France. After his return he was appointed secretary of state by President Washington, but resigned in 1793. One of the reasons was private business, and another the fact that he and Alexander Hamilton, also a member of Washington's Cabinet, could not agree. He was never really happy except in the country.

He was a candidate for president when Washington refused to accept a third term, but John Adams, of Massachusetts, was elected. It was the law then that the man who received next to the highest vote should become vice-president, and so Jefferson held that office for four years. In 1801 he became president, and served two terms. He might have been elected again, but, like Washington, refused the honor.

He was much opposed to show of any kind, and went to the Capitol very quietly, when the time for the inauguration came. There is a story that he rode alone on horseback, hitched his horse to

the fence, and entered the building. The truth seems to be that some friends came to the house where he was stopping, and that together they walked to the Capitol. With Jefferson's administration there began an era of "republican simplicity." He believed in plain clothes, in simple food and simple manners. On the Fourth of July and the first of January he threw the White House open to the public, but he declined to hold the weekly levees that had formerly been the custom. As a leader he was most lenient and just. One interesting incident is told of him that well points out the character of the man. While riding, he met a stranger who bitterly railed against the President.

"Do you know Mr. Jefferson personally?" he was mildly asked.

"No, nor do I wish to," the man replied, violently.

"But is it fair to repeat such stories about a man and condemn one whom you do not dare to face?"

"I shall never shrink from meeting him if he ever comes my way."

"Will you then go to his house tomorrow and let me introduce you to him, if I promise to meet you there?"

"Yes, I will."

The next day, to his unbounded astonishment, the stranger learned that he had been talking with the President himself. So struck was he by Jefferson's charming personality and fairness of mind that he became the President's firm friend and supporter ever afterward.

True politeness, springing from a warm heart, ruled all of Jefferson's words and actions. One day he and his grandson were out riding together. A passing negro bowed to them. The young man did not notice the salutation, but Jefferson courteously returned the bow. "Would you permit a negro to be more of a gentleman than yourself?" he sternly asked his grandson.

For the seventeen years following his retirement from office Jefferson lived at his home, Monticello, which became a resort for the great and noble minds in the country. But keeping open house to all who came ruined Jefferson financially. To his great grief, he was forced to sell his library, which he had been collecting for over fifty years. The money thus obtained was but a temporary relief. Some friends heard of his difficulties and raised the sum of \$18,000. Jefferson was greatly

touched by this proof of the loyalty and affection of his countrymen, but he did not live long to enjoy the relief thus given him. He was now, as he said, "like an old watch, with a pinion worn out here and a wheel there, until it can go no longer."

Few men of his time were interested in so many things. He loved mathematics, music and botany, knew several languages, and was a skillful architect. He was a fine shot and a good rider. More than all else, he believed in the rule of the people, and felt that all should be treated with courtesy.

On July 4, 1826, after a short sickness, he went quietly to sleep and so drifted into death. On Thomas Jefferson's tombstone are engraved these words which show which of his deeds he considered most important:

Here was buried

Thomas Jefferson

Author of the Declaration of American Independence

Of the Statute of Virginia for Religious Freedom

And Father of the University of Virginia.

Putting aside the winning personality and loveliness of the man, there are two things alone that would give Thomas Jefferson his niche in American history. He was the "Pen of the Revolution" and wrote for us the Declaration of Independence; and it was during his administration as president, largely owing to his influence, that the purchase of Louisiana was successfully accomplished.

ANDREW JACKSON, WHO ALWAYS DID HIS BEST

Andrew Jackson was the son of Irish parents who had emigrated to America. He was born on the fifteenth of March, 1767, shortly after the death of his father. His birth took place in Union County, North Carolina, though Jackson himself always thought he had been born in South Carolina. A scene from his early boyhood gives the keynote of the life of the child who was to become General Andrew Jackson, seventh president of the young republic.

He stood in the midst of a group of older boys, his fists doubled, his blue eyes blazing. "Don't dare to touch my things!" he said hotly. The older lads stepped back amazed at the sandy-haired

little fury that confronted them. "If you ask me for my things," the child went on, "you may have them, but you *shall* not touch them without my leave." "I could throw him three times out of four, but he would never stay throwed," one of the "boys" said of him long afterward. "He was dead game even then, and never *would* give up."

Times became more and more troubled all over the country, and presently Andrew and his older brother Robert joined the army as scouts. Not very long after, they were taken prisoners by the British. It is said that one of the British officers commanded the lads to clean his boots. They both refused. "Sir," said Andrew, proudly speaking for them both, "I am a prisoner of war, and demand to be treated as such." "I never heard such insolence," fumed the British officer. "Black those boots instantly!" "I am not a servant to any Briton that breathes," he returned coldly. Thoroughly infuriated, the British officer rushed upon the boy and struck at him. Instinctively Andrew raised his arm, and the blow aimed at his head is said to have broken his arm. His hand bore the scar to the end of his life. Shortly afterward Andrew's mother secured the release of her two sons; but Robert died in her arms two days later of smallpox contracted in the British camps. Andrew also was attacked by that dread disease, but was finally saved. His brave mother died herself soon after from ship fever caught while tending the sick upon the Charleston prison vessels.

Andrew was now an orphan at the age of sixteen, alone and penniless in the big world; but the boy was a fighter born. No circumstances, however sad and hard, could vanquish his brave spirit. He found a home in the family of a distant relative, where for a while he worked as a saddler; then for a short time he taught school. Finally he began to study law at Salisbury, North Carolina. Many years later, speaking of this time of his life, he said, "I was but a raw lad then, but I did my best." That was the secret of his success. Always he did his best.

When twenty-one, he was appointed public prosecutor of the Western District of North Carolina, later to become the state of Tennessee. Soon he began to be widely known throughout the country as a rising man, and when he was twenty-

nine years of age, he was selected by Tennessee to be one of her representatives in Congress. Here, strange to say, he was a fierce opponent of President Washington.

In the meantime he met in Nashville the little dark-eyed woman, Rachel Robards, who was to become his wife. It is said that history does not record a happier marriage. To the world he was overbearing and harsh, and was often profane; but with her he was patient, gentle and courteous, and when he won renown, she was happy for his sake.

In the autumn of 1797 Jackson was chosen United States Senator, but a year later he resigned his office. He was too prominent a man to be allowed to remain a private citizen and was elected to the Supreme Court of Tennessee. Six years later he resigned this post because of private business, and became major-general of the state militia. As there was no war in progress, he continued to practice law and also opened business as an Indian trader. So great was his reputation for honesty that once when a citizen of Tennessee requested a loan from some Boston bankers, backed by a paper signed with two prominent names, they asked, "Do you know General Jackson? Could you get his endorsement?"

"Yes, but he is not worth one-tenth as much as either of these men whose names I offer you," objected the man.

"No matter," returned the bank officers; "General Jackson has always protected himself and his paper, and we will let you have the money on the strength of his name."

But honest and lovable as Andrew Jackson was, his fiery temper led him into many rash acts that hurt his career. At one time, indignant at a supposed insult, he challenged a prominent man by the name of Charles Dickinson to a duel, and shot him dead. In this contest he received a wound which troubled him till his death. He fought other duels and was again wounded. His violent temper made him many enemies, though duels were very common in those days. But withal he was very tender in his dealing with the young and weak. The following story is told by the Hon. Thomas H. Benton in his *Thirty Years' View*.

"I arrived at his house one wet, chilly evening in February, and came upon him in the twilight, sitting alone before the

fire, a lamb and a child between his knees. He started a little, called a servant to remove the two innocents to another room, and explained to me how it was. The child had cried because the lamb was out in the cold and begged him to bring it in, which he had done to please the child, his adopted son, then not two years old. The ferocious man does not do that, and though Jackson had his passions, they were for men and enemies—those who stood up against him—and not for women and children, nor the weak or helpless; for all of whom his feelings were those of protection and support."

Truly this man was a strange combination of harshness and tenderness. To a woman or a child he was always soft and gentle. In his eyes his friends could do no wrong, but he was bitter toward his enemies. While an act of injustice made him angry, he was sometimes unjust and unkind toward those who had injured him or his friends. He always did what he thought was right.

It was during the Creek Indian War that Jackson won for himself the term of "Old Hickory," which grew to be a name of endearment among his soldiers, for they would proudly tell each other that the general was "tough as hickory," and could be depended upon just as surely. Later Jackson served in the War of 1812, gaining for himself much renown and an undying name for fairness to his foes and bravery in battle. His chief fame as a soldier was gained by the surprising victory at New Orleans.

In 1824 Andrew Jackson was among the candidates for the presidency, but, owing to the enemies made by his hasty temper, he was defeated in favor of John Quincy Adams. On December 23, Rachel, his beloved wife, died, leaving her husband utterly stunned and broken-hearted over his loss. For years he was inconsolable, and until the end of his life he wore her picture upon a chain about his neck. There was no other woman in the world for him. When he came to the presidency in 1829 he provided the White House with no mistress, and during his eight years of residence there the gentle face of his wife was the last thing upon which Jackson looked at night. It was the first thing upon which his eyes rested in the morning.

Jackson served two terms as president, and upon his retirement from office

he returned to his home, The Hermitage, to spend the remainder of his days among his own people. "The people of Nashville met him with outstretched arms and tearful faces. He was seventy years old, *their* president, and he had come home to live and die with them." Eight years later, on Sunday, June 8, 1845, the family and servants gathered in the sick-room of Andrew Jackson. They were weeping bitterly; but peace was written in the face upon the pillow. The spirit of the fiery, great-hearted man was at rest. He was going—home—to *her*.

ABRAHAM LINCOLN, WHO SAVED THE UNION

He first saw the light February 12, 1809, in a little log cabin in Kentucky. The Lincoln family in some parts of the country was prominent, but this branch had come down in the world. The cabin was a ramshackle affair; the clearing in which it was built was rank with weeds; the few acres of corn that stretched away to the woods were choked with high grasses and creeping vines. Abraham's father was a carpenter, but he neglected his trade to spend his time wandering about the woods, his gun in his hands, his dog at his heels. To Mrs. Lincoln was left almost the entire care of the little clearing, and to the wonderful energy and brave cheerfulness of this woman Lincoln owed the incentive of his life. "God bless my mother," he said in later years. "All that I am or ever hope to be, I owe to her."

When a log schoolhouse was opened in the neighborhood, it was Mrs. Lincoln who wished to send her children to learn the alphabet and master the spelling-book. Her little daughter and son attended the school so long as it was open. Often she gathered the children at her knees. "You must learn to read and write," she said wistfully, a gaunt, toil-worn hand upon each upturned little head. "You must get knowledge, so that when you grow up you will be wise and good."

Lincoln's father was of a wandering disposition, and when Abraham, or Abe, as the boy was called, was seven years old, he moved his family to a farm in Indiana, then almost a wilderness. Here, in the late autumn, they selected the spot for their new farm, and father and mother and little son all set to work with axes in their hands to make a clearing in the woods for their new home.

Winter was almost upon them, and with more haste than care they built themselves "a half-faced camp" of logs.

In the autumn of 1818 a strange sickness broke out all over the countryside, killing men and cattle by the dozens. Mrs. Lincoln was among the ones stricken. A week after she was taken ill, her husband and little son, with heavy hearts, built the rough pine coffin for the wife and mother who had loved them so well and served them so faithfully. A winter of dismal loneliness descended upon the Lincoln family. The children missed her piteously. Often their father was away for long hunting trips, leaving them alone in the cabin in the wilderness. Night would find the two huddled together against the cabin wall, their arms about each other, their ears straining for the sound of footsteps that did not come, and hearing only the dismal howling of the wild animals that prowled about in the darkness.

It was a happy day for them when their father brought home a new mother, with her son and two daughters. At first the Lincoln children hung back shyly from the new-comers. But the sweet, motherly ways of the new Mrs. Lincoln soon won their hearts. She was a very capable woman. It was not long before she had the disorderly cabin spick and span. She brought with her some new furniture and a goodly array of bright pots and pans, and soon the place was fairly shining with a sweet wholesomeness and comfort it had never known before.

When Abraham was eleven years old, a schoolhouse was built not very far from their home, and the question again arose whether the boy should be allowed to attend. His father contended that a big, able-bodied boy like Abe was of more use on their little farm than he could ever be at school; but his new mother said, "No, the boy must be given an education." Abraham went to school, and this was the beginning of his love for books. The boy's school life was irregular, for he was much needed on the farm. In all, he attended school hardly more than a year, but he never let an opportunity slip to read everything on which he could lay his hands. Many weary miles Abraham traveled to borrow books. After his day's work was ended he would read as long as it was light; then, lying on the floor in front of the

fireplace, with the aid of the glowing coals, he would read on into the night, often writing his compositions on a wooden shovel with a piece of charcoal. When the surface was covered he was sometimes obliged to shave off the first part of his work to make room for the last.

At nineteen, Lincoln made a trip in a flatboat down the Mississippi River to New Orleans. It was not long after this that the Lincoln family once more started on the trail. This time they moved to Illinois. There young Lincoln helped to build the log cabin, and to split rails to fence the fields. After another trip to New Orleans he took a position as clerk in charge of a store in New Salem. When the Black Hawk War began in 1832, he was elected captain of a company, but saw no hostile Indians. He then bought a little store but was not successful, and did some land-surveying. Lincoln's public career began at the close of the war, when for a time he served as postmaster in New Salem.

About this time he "was a tall, gawky-looking fellow, wearing a wide-brimmed straw hat without a band, a homespun shirt and claw-hammer coat, and tow trousers that did not meet his shoes by several inches." Strangers felt, when they looked at him, "this man is a clown." The moment he opened his mouth to speak, all consciousness of his uncouth appearance vanished from their minds. Here was a man who dealt with souls. The people had so much confidence in him that they elected him to the legislature in 1834, and he was re-elected three times. Meanwhile he studied law, and was admitted to practice in 1836. In 1846 he was elected to Congress and served one term.

For several years after his return from Washington he devoted himself entirely to the practice of law; but in 1854, when the entire country was roused over the Kansas-Nebraska Bill regarding the admission of slave states to the Union, Lincoln again came to the front and took an active part in public affairs. He protested that "slavery is founded on both injustice and bad policy." Then followed the famous debates between Lincoln and Stephen A. Douglas, the "Little Giant" of Western politics. Both were candidates for the United States Senate in 1858, and

the debates caused much excitement. Douglas was elected, but Lincoln had gained a great reputation.

In 1860 Lincoln was nominated for the presidency by the Republican party, and was elected in November. Upon the news of his election the long-expected division of the nation upon the slave question occurred. South Carolina soon seceded, and others followed, until there were eleven states in the Confederacy. On the eleventh of February, 1861, Lincoln spoke a few words of farewell to his own people, and with a sad heart turned toward the capital, "to assume a task more difficult than that which devolved upon Washington." The outlook was indeed gloomy.

In the beginning the new president did not have the support of all in the North. Many were opposed to keeping states in the Union by force, and others dreaded the rule of the new Republican party. Several leaders of the party were much better known than he, and some of them had expected to be named for the high office which had gone to the awkward, uneducated Westerner. They could not understand a man who told funny stories in such a time, for they did not see that every one of his stories had a point which illustrated the matter in hand. These people thought that the country was in the care of a man who could not save it.

The Civil War opened with the firing upon Fort Sumter by the Confederates, and the years that followed were full of trial and terror to the nation. Steadfast amid the clamor of his foes, Lincoln held to his purpose and policy to unite the North and South. But while the President toiled in the executive office, his heart was bleeding for his fellow-countrymen who were falling by the thousand on the field of battle, sorrowing even as a father in the sorrows of his children. He had but one thought through all those dark years—the *preservation of the Union*. "If I could save the Union without freeing any slave," he wrote a friend, "I would do it; and if I could save it by freeing all the slaves, I would do it; and if I could save it by freeing some and leaving others alone, I would do that. What I do about slavery and the colored race, I do because I believe it helps to save the Union: and what I forbear, I forbear because I do not believe it would help save the Union."

On the first day of January, 1863, President Lincoln issued the Emancipation Proclamation, freeing all the slaves in the Confederate States of America. In 1864 he was re-elected to the presidency, but the pressure of public affairs became so unbearable that it seemed as if this strong man were carrying more than he could endure in heart and mind. "I think I shall hardly live out this term of the presidency, the burden is so great," he said. Yet there was nothing of weakness about Abraham Lincoln. He faced each problem squarely as it came.

With the sure hand of a leader of men he guided the nation into peace at last. General Lee surrendered at Appomattox, April 9, 1865. It was certain that there would be little more fighting. The President's purpose was accomplished, the Union was saved. The country went wild with joy. Bells were rung; and the people shouted the good news to each other, laughing as they told it; while prayers of thanksgiving were offered up in the churches all over the land.

In the midst of rejoicing there came a great shock. While attending the theatre, in Washington, April 14, 1865, the President was shot in the head by an actor, John Wilkes Booth. The assassin entered his box, shot his victim, and sprang to the stage below. He fell and broke his leg, but managed to reach his horse, which he had left at the door, and galloped away. But for his accident he might have escaped. As it was, he was able to conceal himself from the thousands searching for him for twelve days. Finally he was trapped in a barn, and shot when he refused to surrender.

It was only when the first fury for revenge was over that the people came to the real bitterness of their loss. "This was a man," they said, and choked as they said it. Of Abraham Lincoln, Robert Ingersoll wrote: "It is the glory of Lincoln that, having almost absolute power, he never abused it, except on the side of mercy. Wealth could not purchase, power could not awe, this divine, this loving man. He knew no fear except the fear of doing wrong. Hating slavery, pitying the master—seeking to conquer, not persons, but prejudices—he was the embodiment of self-denial, the courage, the hope and the nobility of a nation. He raised his hands, not to strike, but in benediction. . . . Lincoln

WHERE ABRAHAM LINCOLN KEPT STORE



The abandoned village of New Salem, Menard County, Illinois, where Lincoln lived from 1831-37, has been partially reconstructed and made a state park. This is a reproduction of the store of Denton Offutt, of which Lincoln had charge from July, 1831, until Offutt failed, in 1832. The village contained about twenty-five houses.



William F. Berry and Abraham Lincoln bought three stores on credit and consolidated them. Neither partner was intended for a merchant and the new firm soon failed. Berry died, and Lincoln paid off all the debts, though it took him fifteen years to earn the money. This is a reproduction of the Berry and Lincoln store, where Lincoln also served as postmaster of the village.

Photos, Herbert Georg, from collection of Herbert Fay, custodian Lincoln Tomb, Springfield, Ill.

HOME AND GRAVE OF ANN RUTLEDGE



The tavern, which has been rebuilt, was the largest building in New Salem. It was kept by James Rutledge, the leading citizen of the community, who lived there with his wife and nine children. The Berry and Lincoln store was a few hundred feet away. The building beyond is the new Lincoln Museum, in which there is an excellent collection of relics of Lincoln and of pioneer days.



Ann Rutledge, daughter of James, was an ambitious and attractive girl. She and Lincoln read and studied together, and in 1835 became engaged; but in the summer of the same year she died of fever, saddening her lover's life. Her grave is in the cemetery at Petersburg, two miles away. When the railway station was located at Petersburg most of the inhabitants of New Salem moved there.

Photos, Herbert Georg, from collection of Herbert Fay, custodian Lincoln Tomb, Springfield, Ill.

was the grandest figure of the fiercest civil war. He is the gentlest memory of our world."

ULYSSES S. GRANT, SOLDIER, PRESIDENT AND AUTHOR

Hiram Ulysses Grant was born at Point Pleasant, Ohio, April 27, 1822. His father was a farmer and a tanner, and the boy's early life was spent on the farm, where he had the usual experiences of a country boy. He helped around the house and barn, and, as he grew older, worked on the farm in summer and went to school in winter. He was honest and plucky, but does not seem to have been unusual in any way. He was not brilliant at school, but was fond of horses and a skillful rider. So far as anyone could see, there was no sign of future greatness in the shy, rather awkward lad.

His father was anxious to have him get an education, and asked his member of Congress to appoint the boy to the United States Military Academy at West Point.

One day his father said to him: "Ulysses, I believe you are going to receive the appointment."

"What appointment?" asked the boy, startled.

"To West Point. I have applied for it."

"But—but, I don't want to go," stammered Ulysses in distress.

"But, I wish it," returned his father, decidedly.

"Very well, father," said the boy at length, "I suppose I'll go then."

Ulysses at once buckled down upon the weary work of preparation for the entrance examinations. Day after day the boy, whose only fondness was for horses and out-of-door life, plodded through his books. Finally the dreaded trial came. The examination was successfully passed and young Grant was admitted to West Point. The Congressman knew that the boy was called Ulysses, and supposed that he had been named for his mother's family. He had therefore sent in his name as Ulysses Simpson Grant, and by that name he was afterward known.

The years at the military academy did not pass swiftly to Ulysses. When he first entered, he was so awkward and slow that he was the butt of many jokes; but he was so honest and manly that before

long he won the sincere respect of all his schoolmates.

When the four years at West Point were over, the young lieutenant was assigned to the Fourth Infantry. In September, 1843, he reported for duty at Jefferson Barracks, St. Louis; and it was there he met pretty little Julia Dent, the sister of one of his classmates. Lieutenant Grant soon became her devoted admirer. In 1845 he was ordered to the front in the Mexican War; and before he left, he became engaged to this little lady of the West. In the Mexican War Grant and Major Robert E. Lee fought together.

Young Grant came out of the Mexican War with a practical knowledge of military tactics, and soon after his return married Miss Julia Dent. Hard times followed for the young couple. In 1852 Grant was ordered to the Pacific coast, and though he was promoted to captain, he found it impossible to support a wife and two children on the pay of an army officer. He therefore resigned from the army and returned to St. Louis. He must provide properly for his little family by some means or other, and tried to make a living, first by farming, and then by dealing in real estate. He failed at both, and was glad to take a place in his father's leather store in Galena, Illinois, in 1860. It seemed as if his life were not to be a success.

With the coming of the spring of 1861 a great event took place which changed the history of many thousands of people in the United States, and among them that of the Grant family. With the election of Abraham Lincoln, South Carolina, followed by ten other southern states, seceded from the Union, and war opened between the North and South.

Ulysses S. Grant went to Springfield to do whatever he could for the nation. His request to be restored to the regular army was not granted, and he helped in mustering in the Illinois volunteers. He soon was appointed to command the Twenty-first Illinois Volunteers. The regiment was a disorderly one, and its former colonel had been dismissed because he could not control his men. Grant appeared on the parade ground in the suit of a private citizen, and a rather shabby suit at that. The men jeered disrespectfully. "Speech! Speech!"

they demanded sarcastically. Grant quietly ran his eye over the disorderly lines.

"Soldiers," he said, in a tone that was not to be mistaken, "go to your quarters." One by one they slunk away. "Grant knows what he is about," they remarked to each other with sheepish admiration. And he did. He drilled his men, and redrilled them, and drilled them over again, until they obeyed absolutely. Soon he was promoted to brigadier-general. So successful was he in his undertakings that before long he was raised to the rank of major-general. When besieging Fort Donelson, he was asked to discuss the terms on which the fort would be surrendered. He replied that he would accept no terms except "immediate and unconditional surrender." After that he was often called "Unconditional Surrender Grant."

So successful was General Grant in his movements against the Confederate army that before long the whole country was ringing with the name of the man of whose very existence but a small number of people had been aware a few years back. He was given command of larger armies and made good use of them. When Vicksburg with 30,000 men was captured July 4, 1863, the War Department felt that it had found a real general at last. The battle of Chattanooga added to his reputation.

When the news of the battle of Chattanooga reached Washington, Congress decided that there was but one man who could lead the Northern forces to victory, and that man was Grant. The grade of lieutenant-general was created, and President Lincoln immediately appointed General Grant and gave him command of all the armies of the United States. No other general, save Washington, had ever received such an honor.

For three years the outcome of the Civil War had been more or less doubtful; soon all uncertainty as to the results was removed from the minds of the people. Battle after battle was fought, all leading up to the last desperate stand of the Confederate army before Richmond and the surrender of General Lee at Appomattox Court House on April 9, 1865. In recognition of his services, Congress created for Grant the grade of "general," a higher title than even George Washington received.

In 1868 General Grant was elected president of the United States, and served two terms, but he was not so successful as president as he had been as a soldier. As a soldier, he had kept his intentions to himself until ready to issue his orders. He did not always work in harmony with Congress while president, and his loyalty to his friends made trouble for him. Some of them did wrong, but President Grant could not be made to believe it. The fact that they were his friends made him stand by them to the end.

Upon his retirement from the presidency, General Grant set sail for Europe. Everywhere he was received with shouts and waving flags. In some places crowds sang Hail Columbia and The Star-Spangled Banner. Lord Beaconsfield said to Queen Victoria: "We will be doing honor to a wonderful general and pay a high tribute to a great nation if we receive ex-President Grant as a sovereign." And as a sovereign he was greeted in every land.

The old age of this great general was not a happy one. After returning to America, he settled down in New York City as a private citizen, going into the banking business. But in this business he unfortunately lost all the wealth that fortune had showered upon him. The manager of the bank proved dishonest, and Grant was again left a poor man in his old age. For a while he wrote magazine articles. Then, with the coming of a serious throat trouble, he set to work to write his Memoirs. Early and late he toiled away at his hard task, until he was almost too weak to sit up in a chair, for his family must not be left penniless after his death.

One day he laid down his pen with a sigh of satisfaction. The Memoirs were finished. Thousands of people had subscribed for his book—the future of his family was provided for. Only a few days later the body of the great soldier was borne in state to the City Hall in New York, where thousands came to do the last honors to the great general. For a while it was placed in a temporary vault beside the Hudson. Then his body was carried to the white marble tomb on Riverside Drive, which was to be the last resting-place of the "protector of our American Union."

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 1157.

ONE REASON WHY THE FORESTS ARE DISAPPEARING



The uses of wood are almost numberless, but here is one use which is growing day by day. These logs have now arrived at the pulp-mill where they will be ground up, as the first step in making paper. The newspaper your father reads in the morning may have grown in the depths of a Canadian forest. Think how many thousand trees are lying here beside the elevated track from which they have been dumped. You will be able to follow these logs until they are in the form of this book. It is no wonder that the forests are rapidly disappearing. Those in the United States will soon be gone. In some places spruce is planted especially for the making of paper.

Photo, Brown Bros.

The Book of Familiar Things



THE WONDER OF A BOOK

A BOOK is one of the great marvels of the world. Perhaps a newspaper is more wonderful still, because a newspaper comes and goes almost in an hour, and yet it has in it the work of thousands of men. Your father buys a newspaper for a few cents, and tears it up when he has done with it; yet that paper is something like a miracle, for it may have had its first beginning in a tree. Paper is made from pulp, which is made from many things such as rags, flax, hemp, straw, grass and jute. But the greater part of the paper made for newspapers and books comes from trees, which had lived and helped to make the world beautiful for many years.

The pictures on the following pages show us how our own book is made, from the very beginning of it to the moment it is ready for us. But it is not possible to give any idea in pictures of the great work and thought that go to make a book. Men must think about it, and write their thoughts on paper; and no pictures can show us how many men have been thinking for years and years about the things set down in our book. We can see the men cutting down trees; we can see the men making paper; we can see the printers at work. But the real thought that makes a book can never be seen.

All that men think is written to-day

in books, just as all that men have seen is painted in pictures. Nothing has

been able to stop the men who write books. Kings have tried to stop them, great tyrants have burned their books, and writers have been tortured by fire. But nothing can ever destroy the power of writing or stop the growth of books, because books have spread themselves now throughout the world, and there is no part of the world without them. They are the only things that live forever; because, although one book may perish, new copies are made as the old ones pass away.

At first men painted or carved pictures and signs on bones and wood and bark and stone; then they made bricks of clay and stamped inscriptions on them; then they carved their hieroglyphics on the walls of temples. The Egyptians were probably the first people to invent a kind of paper, and the word papyrus was the name of the bulrush from which they made it. It is probable that the ark in which the little Moses was placed by the river's brink was made of this bulrush.

The papyrus was not really paper as we know it now. It was simply the pith of the plant pressed together. We really owe our modern paper to the ingenious Chinese. Originally the Chinese wrote on bamboo boards, or on a tissue of silk, but in the first century

of the Christian Era, or perhaps before, a clever Chinese succeeded in making paper of bark and hemp and rags.

We do not know when the first piece of real paper was made, but there is an extraordinary story of the oldest paper documents which have come to light. It carries us away to the ruins of the Chinese Wall which stretch across the desert sands of Turkestan. They have been explored by Sir Aurel Stein, who went out for the British Museum to trace the lost cities under Asian sands. Here and there along the ancient wall stand the ruins of old watch-towers, and in a heap of rubbish in one of these towers Dr. Stein and his workers made a wonderful discovery.

They found wooden tablets with Chinese inscriptions, a strip of silk paper with writing on it, and bundles of letters on actual paper made from bark and rags. The letters were in an unknown tongue, but the language has since been translated, and there is evidence which convinces Dr. Stein that these three kinds of writing were deposited in the tower about the same time, and the date is fixed by the writing on the wooden tablets, which are dated in the actual year of the birth of Christ. Here, in this ruined tower, with the sands of time blowing all about it, three civilizations seem to have met, and the first three kinds of writing materials lay side by side. These letters are the oldest pieces of paper known. The oldest paper document known before went back to about a hundred years after Christ; these take us back, perhaps, a century earlier.

WHAT EUROPE LEARNED FROM CHINESE CAPTIVES

The paper the Chinese made in those days was made chiefly from the bark of the mulberry tree—the tree that silkworms feed on, so that to the same tree we owe both silk and paper. In that first century, however, China was little known, and for about seven hundred years Europeans learned nothing about paper. It was only by an accident that paper-making found its way to Europe, and it was an accident of war. It happened in this way: In A.D. 751 the Arab governor of Samarkand, a city in Central Asia, captured some Chinese paper-makers who were with a Chinese army invading his capital. These men instructed the Arabs, and the Arabs, in their career of conquest, introduced the invention into Europe.

Now, what was the secret of the Chinese paper? They mashed up the bark of the mulberry so that the woody fibres were broken up and pulled apart. The tiny fibres were then allowed to sink through the water on a grating, where they formed a kind of tangled felt-work which could be compressed together into a thin sheet. Roughly speaking, that is the principle on which the Chinese made paper, and though paper-making has been improved and elaborated century after century, the principle remains the same, and all modern paper consists of a deposit of vegetable fibres. Not only wood, but any vegetable fibre, can be used, and about four hundred different kinds of woody fibre have been tried at one time and another, though the fibres now chiefly in use are cotton, linen, straw, wood and esparto grass.

THE AMAZING POWER IN THE WORLD OF STARCH AND CELLULOSE

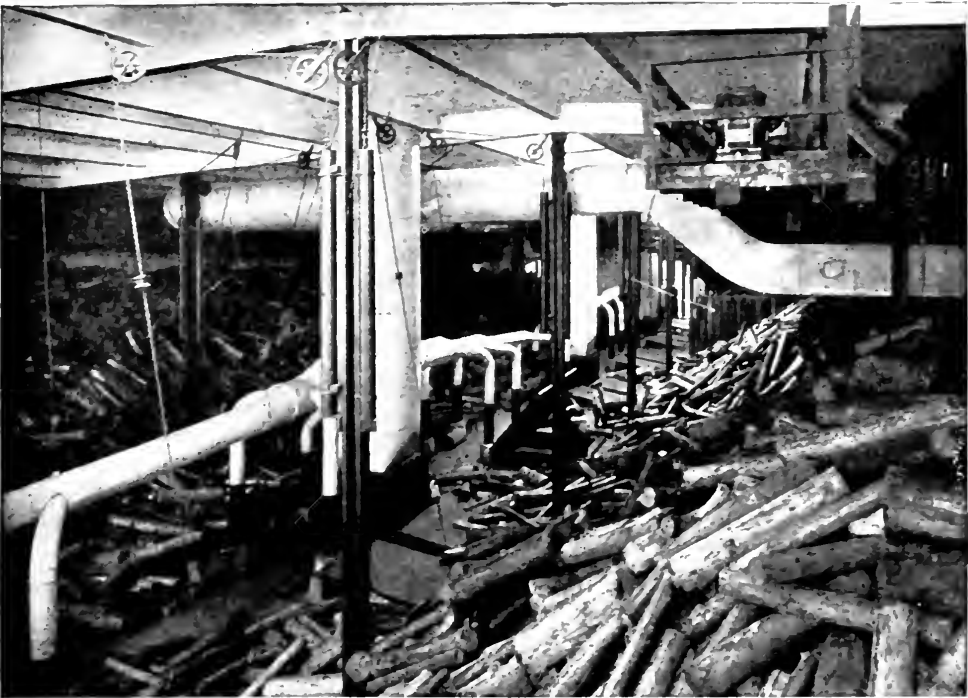
Vegetable fibre consists of a substance called cellulose, and, even apart from its uses in paper-making, cellulose is a very interesting natural product. No man has ever succeeded in manufacturing it. It is manufactured in green leaves by the sun, and were there no green leaves of plants, there could be no white leaves of paper.

If a chemist were asked what is the most important substance in the world, he might answer Starch, because starch is the material out of which all flesh is made, and the chief fuel of the fire of life, which gives energy to all living creatures. And if he were asked what is the next most important substance in the world, he might say Cellulose, because cellulose, with ink on it, is the most important fuel in the furnace of the mind and the soul of man.

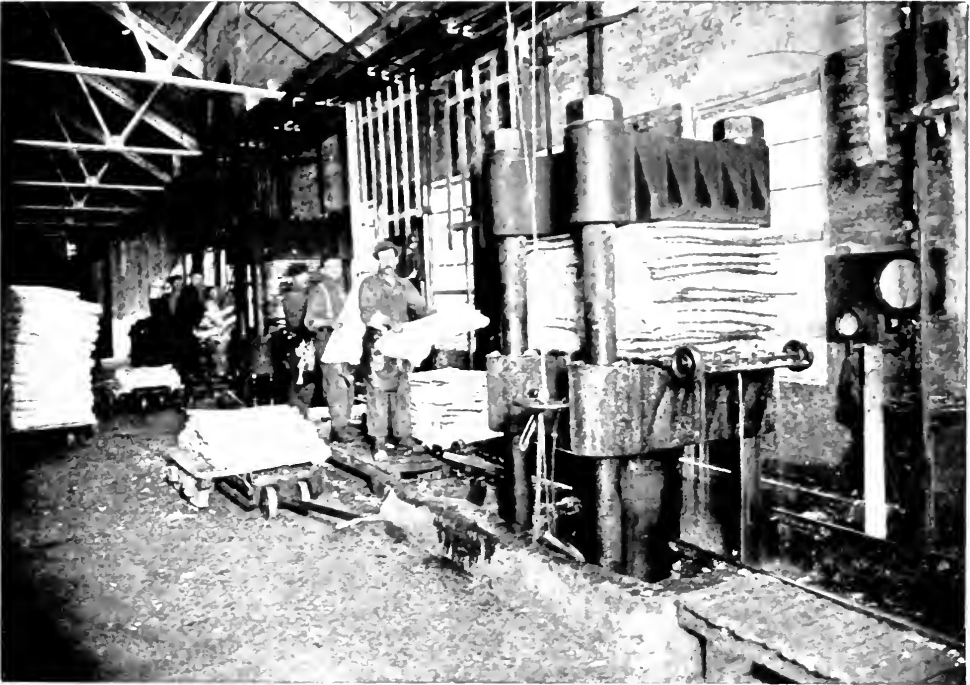
THE FIRST PLACE IN EUROPE WHERE PAPER WAS MADE

Now to return to our paper-making. Paper was brought from China to Samarkand on the point of an Arab sword, and by the same conquering sword it was carried to Europe. Toledo, in Spain, was the first place in Europe to practice the art. That was in the eleventh century. In the thirteenth century the art reached Italy, and in the fourteenth it arrived in Germany, but not till the fifteenth century did it reach England, and not till the eighteenth was paper made in England in any great quantities or with any great skill. At first European paper was made

IN THE PULP FACTORY



On page 1052 you saw the logs as they come to the mill. The logs are called pulpwood and are used for paper. When they have been cut up into short lengths, the bark is taken off and they are put into the grinders which will reduce them to chips. Then they are cooked for several hours under pressure, and according to the different acids used, are fit for writing, wrapping or book papers.



After the wood chips have been cooked with acid, the pulp is drained and then run along on copper-wire conveyors, some of which have a broad mesh and some a fine. The marks of a broad mesh can be seen in this picture, and now the pulp is being placed in hydraulic presses and pressure from beneath applied till it is ready to be packed in bales to send to a paper factory. Photos, British and Colonial Press, Ltd.

almost entirely of rags, and even still rags are largely used, but now the main raw material is wood, and some publications, such as this book, have their own forests. It makes one's brain reel to think of mighty forests turned into sheets of white paper covered with the thoughts we write.

**THE LITTLE INSECT THAT SHOWED
MAN HOW TO MAKE PAPER**

Thousands of years before man discovered how to utilize wood in this way (thousands of years before the Chinese paper-maker) a little insect, really the first paper-maker, had been making a paper nest out of wood. The wasp's nest is really a wood-paper, for it is made of paper manufactured from decayed wood, and it was this nest that suggested the modern methods of making paper from wood-pulp. When Solomon advised the sluggard to go to the ant, he might also have advised the paper-maker to go to the wasp, but no one thought of going to the wasp till 1765, when a priest of Ratisbon, named Schaffer, began to experiment with wasps' nests and sawdust and wood-shavings, and succeeded in making excellent wood-paper. His experiments were continued by a Dutchman named Koops, and by a Saxon weaver called Keller, who in 1844 made considerable quantities of paper from wood-pulp. The first manufacturers of paper from wood-pulp ground the wood into sawdust, but the resulting paper was poor. Some chemical processes for making pulp were invented, and these have proved so successful that now wood is the chief material in paper-making. One is called the soda process, and the other the sulphite.

**TREMENDOUS FORESTS ARE MADE
INTO PAPER EVERY YEAR**

Whole forests must be converted into pulp, for if we take land planted with trees nine inches thick, it would require a forest of forty million acres in extent to supply pulp even for one year's paper. The area covered by all the paper in the world must be enormous. Forty million acres of forest for five million tons of pulp! One ton of wood-pulp will make over three acres of paper, 180 tons of pulp will paper a square mile, while the annual output of five million tons is enough to paper almost 30,000 square miles. The paper made in one year, therefore, would make a path a mile wide all the way round the world. If all the paper were in the form of a tape an inch

broad, it would reach about twenty times the distance to the sun.

**THE WONDERFUL TYPESETTING MACHINE
WHICH SEEMS TO THINK**

Suppose one of our authors has written a story for you. It comes on paper to that astonishing machine that almost seems to think—the linotype. A man sits on a stool in front of it and taps down the keys, as on a typewriter. As he taps a key a letter cut out in brass falls down into a little space. The next letter slips beside it, and the next, and the next, until a line of letters lie side by side, all cut into brass, so that in another moment, when they are carried to a slot with molten metal pouring through, the metal runs into these tiny brass molds and a solid metal line is made, with the impression of the letters on the surface. There may be a thousand lines in one of our stories set like that, line by line, until it is complete and the paragraphs can be put into columns, and the columns can be put into pages.

One of the supreme inventions of our time is the linotype, but wonder on wonder is to come. The paragraph lies still in its place in the column, locked with another into a page with more than a hundred solid metal lines. You can pull a few proofs from a page like that, but the lines might be lost, and the metal would wear out if you tried to print many. How is it done?

First a mold of wax is made which reproduces the page exactly. The mold is then brushed inside with finely powdered graphite and placed in a solution containing copper through which a current of electricity is passed. The metal is deposited upon the mold in a very thin shell. When sufficiently thick the shell is taken out and filled with melted type-metal to give weight and strength. We have now a solid plate which reproduces even the finest lines of a picture as well as every letter and punctuation mark.

These plates go then to the printing press. When the sheets are printed, they go to the binders, where they are folded, stitched, trimmed and bound, as our pictures show. The plates, which are called electrotypes, are then stored carefully until so many people have bought our book that it is necessary to print again. Then they are brought out again. Truly the making of a book is a wonderful thing.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 1215.

THE BEGINNING OF PAPER-MAKING



After the rags have been sorted, dusted and cut into small pieces, they are placed in this rotary digester, where they are boiled for several hours with lime under steam pressure.

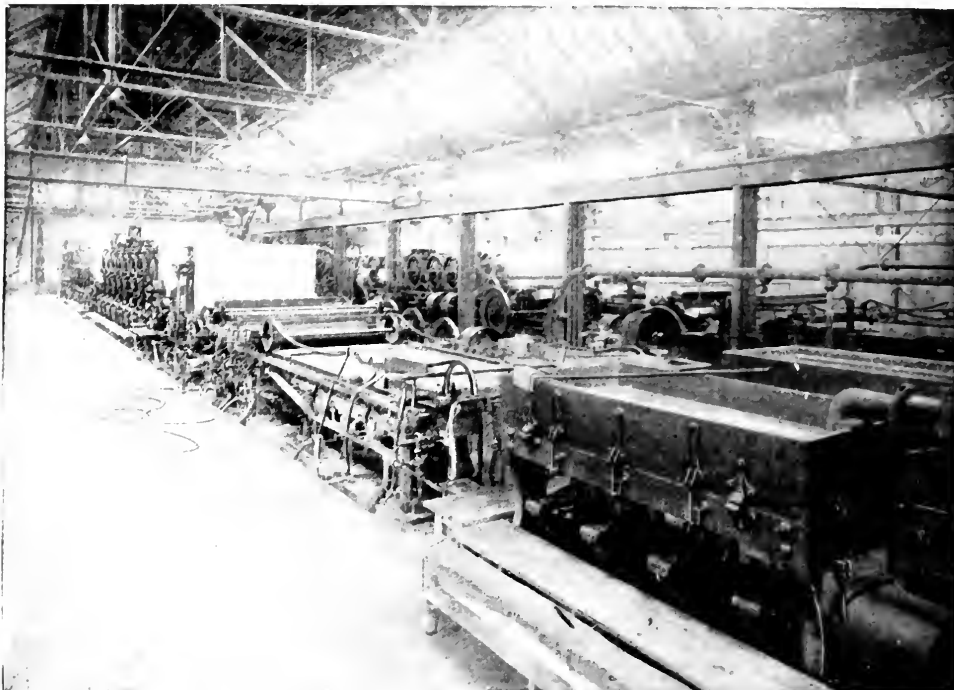


Next they are washed, beaten up and bleached. The result is a mass of fine white fibres such as you see here.

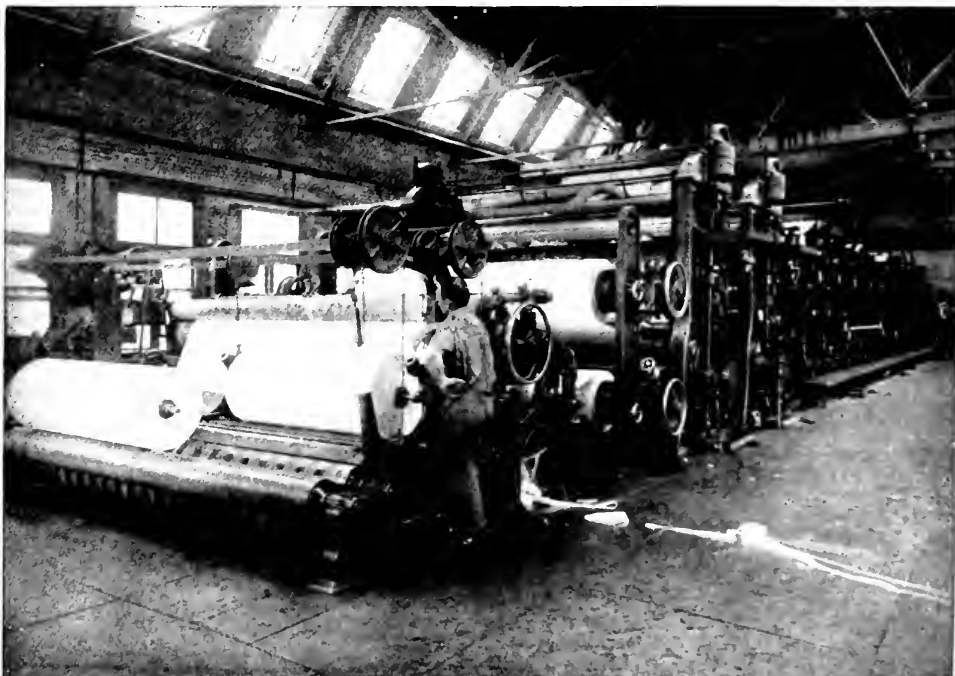


The pulp next goes to the beater, where the fibres are drawn out, separated and mashed up still further. In all except the very finest papers, wood-pulp may be added, and in fact much paper is made entirely of wood-pulp. In these beaters fine clay and rosin are often added to fill up the pores and prevent the paper from absorbing too much ink. Color is also added at this stage, if colored paper is desired.

BOTH ENDS OF THE PAPER MACHINE



The fine pulp mixed with a great deal of water is then pumped into the vats you see here. After passing through screens to keep out lumps, it flows on to the moving flat bed of the paper machine. The bed is of fine wire cloth and the water drains away, leaving a thin film of pulp which soon becomes paper.



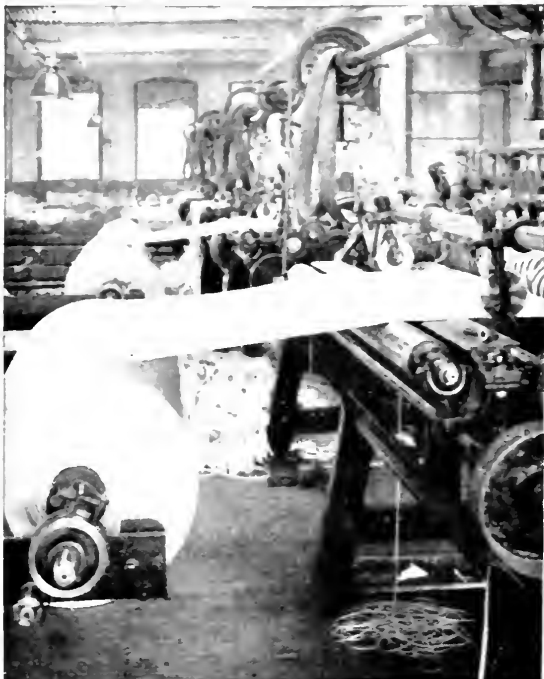
This is the "dry end" of the machine shown above. The film of pulp passes between felt rolls which squeeze out the water, metal rolls which smooth it, hot rolls which dry it, and rolls which smooth it again. The finished paper eleven feet wide is here being split into strips and wound on metal or wooden rolls.

Photos of paper-manufacturing, courtesy S. D. Warren & Company.

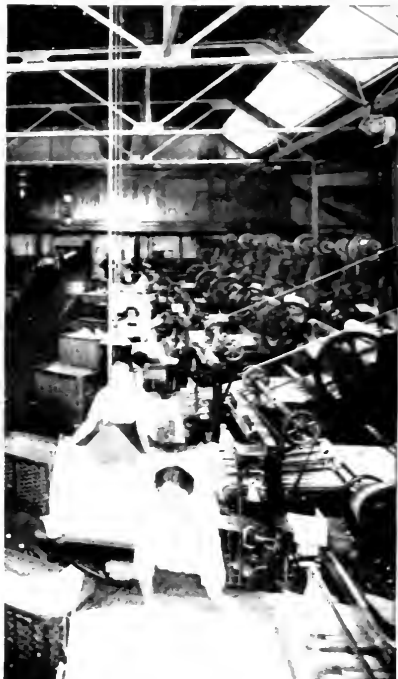
THE LAST PROCESSES IN MAKING PAPER



For very fine work the surface is not yet smooth enough. Here you see rolls of paper beginning the journey through a bath of coating mixture, composed of clay with glue and other things, some of which are secrets of the manufacturers. The paper is then dried in long galleries, rewound, and again passed between heavy calender rollers. It will soon be ready to go to the presses you see on another page.

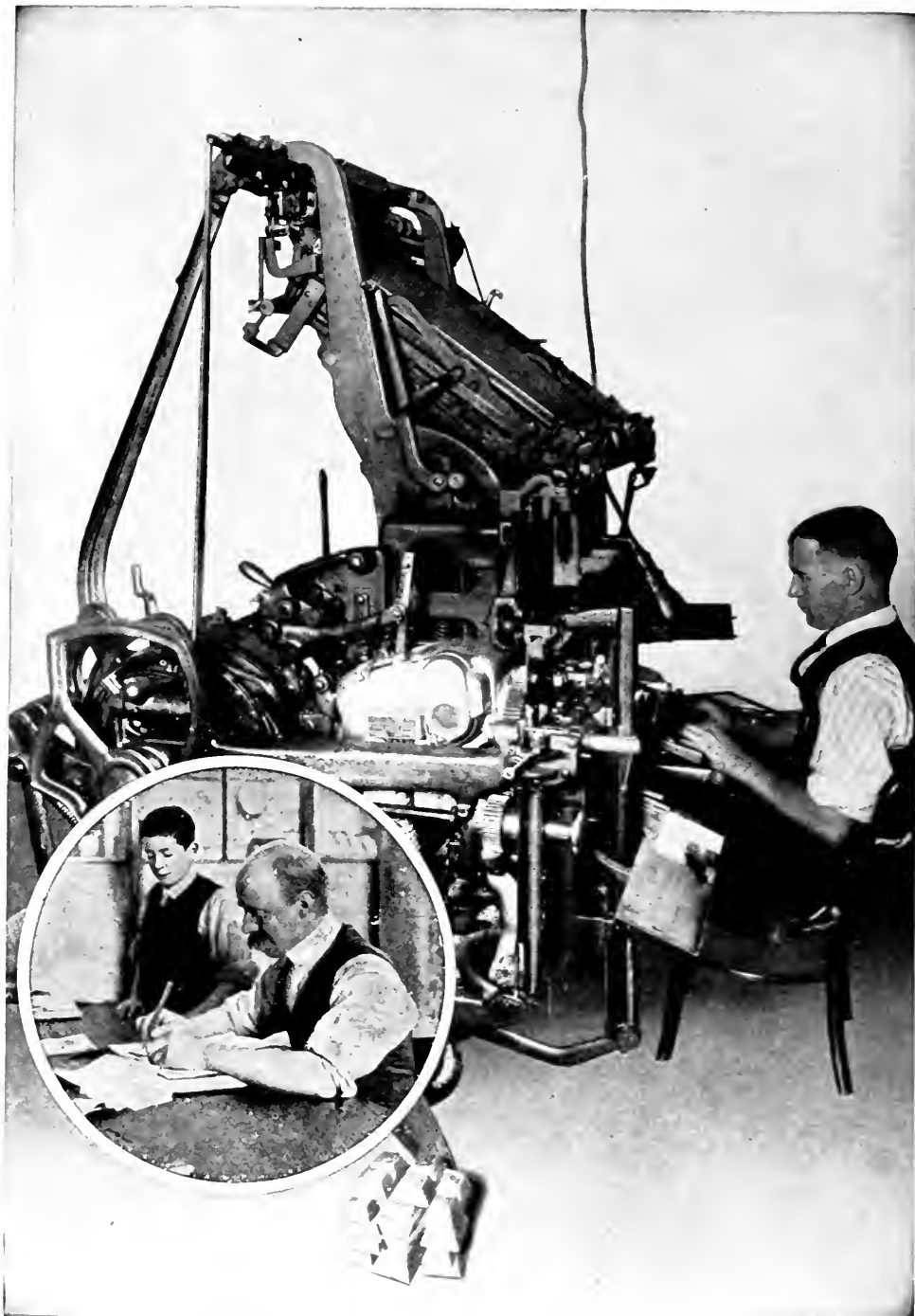


For many purposes paper is used in sheets instead of rolls. Here the rotary cutters are trimming the paper to the exact width desired and other knives will soon cut it into sheets.



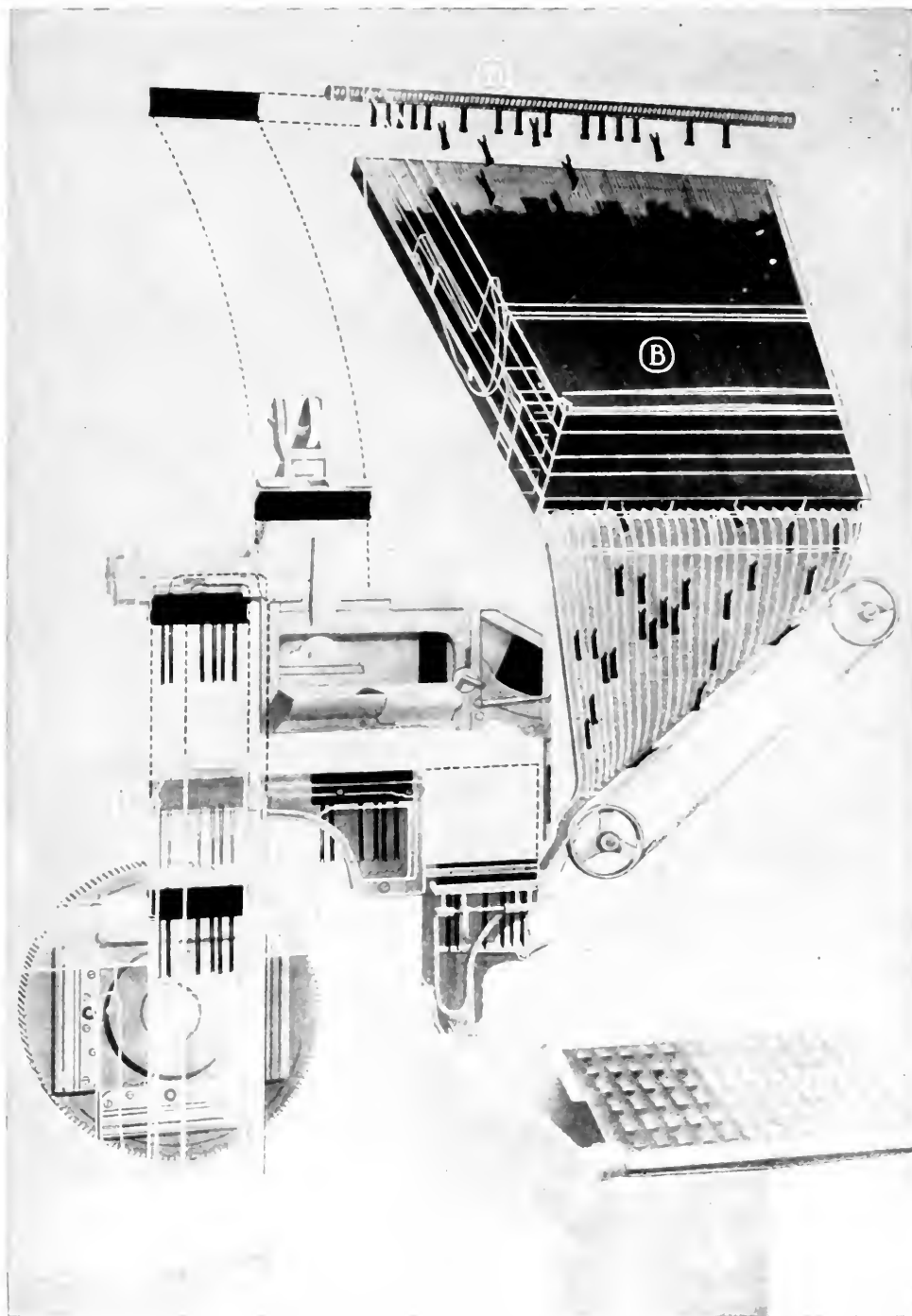
From this end of the cutting machines the rolls of paper appear in the large sheets which are used in printing this book.

THE BEGINNING OF THIS BOOK



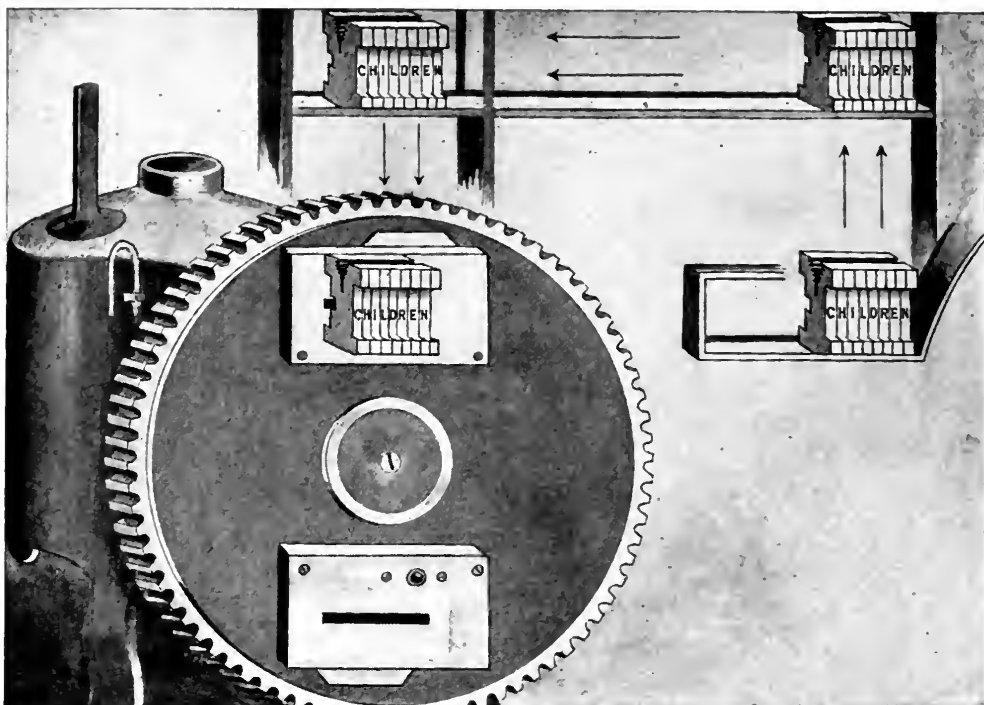
When the writer has set down his thoughts on paper, and the editor has prepared it for the printers, it is then passed on to be set up in type. In the small picture on this page the master-printer is marking the copy for the boy to take to the man at the machine. This machine is the most wonderful thing in printing. It almost thinks. By pressing down keys as we do at a typewriter, or a piano, the man at this machine sets the words in metal lines. Almost as fast as a man can think, this machine puts his thoughts in solid metal. The machine is called a linotype, because it sets up lines of type. Pictures show how it works. The linotype was invented by Ottmar Mergenthaler, but has been much improved.

THE MACHINE THAT ALMOST THINKS

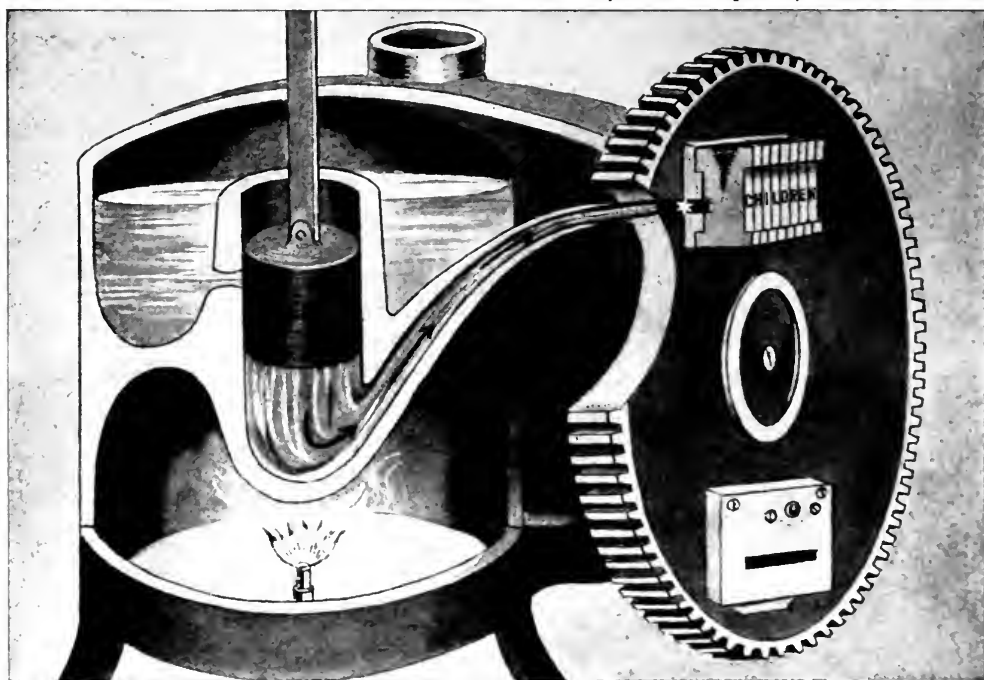


This picture shows how the little pieces of brass (called matrices), which shape the type, move in a linotype machine. When a letter in the keyboard A is struck, a matrix with that letter drops from the magazine B, and slides down to the assembling-elevator C. When a line of matrices is finished it is carried to a mold a little to the left and filled with melted type metal, and a line of type is cast. These matrices then go to the distributor-bar D. When a matrix reaches the proper place on the bar it drops down into the magazine, ready to be used again. Three lines are in motion simultaneously, one being set, one being cast, and one being distributed.

HOW THE WORDS ARE SET IN METAL



The brass letters are carried automatically from their box till they rest against a slot in this wheel. There are two slots to save time. The letters are cut into the brass, not raised up on it, and form molds.



The letters are cut on both sides, so that one line of letters is close to the slot. When this line is ready, a heavy punch comes down into the molten metal and forces it into the slot. The place is marked in the picture by a star, and the vessel is shown as if it were cut in two. When the line of letters is cast, the unused metal rushes back, the wheel turns, bringing the empty slot into position, and the brass pieces and the newly cast line are carried away by an iron band.

PREPARING THE STORY IN METAL FOR THE PRINTING PRESS



The story, which was first written on paper, is now in words of metal, and as the metal lines are ready they are put together so as to form columns like those in our book. The man is here putting the lines together.



Before the story can be printed the printers must be sure that there are no errors, so a proof is pulled by passing an ink roller over the type, and pressing a sheet of paper down upon it so that the type is printed.

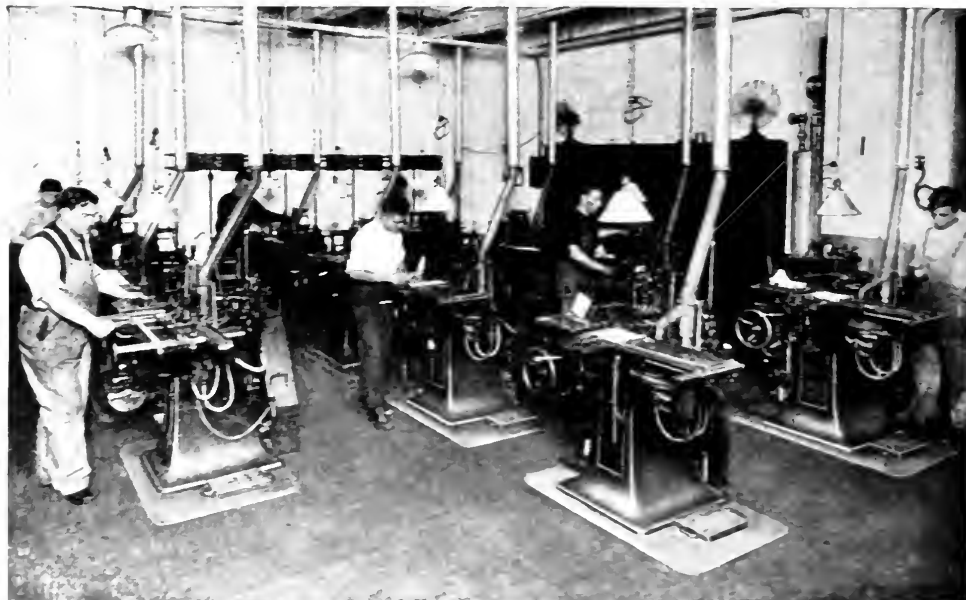


The proofs are then taken to the readers. Every page must be corrected several times before it is printed, and the reader is supposed to be a man who neither makes mistakes himself nor lets other people's mistakes pass.

SETTING TYPE BY MONOTYPE MACHINE



We have seen how the linotype sets our books in solid lines. Here is another wonderful machine which sets in type single letters, as its name—monotype—tells us. Instead of having all the work done by one person we now find two operators, one at the keyboard, and another at the casting-machine. The keyboards are very large, looking much like two or more typewriters all together. The keys actuate a punch, which makes holes in various positions on the paper ribbon which unwinds from a spool, the end of which we can see at the top of the machine, and which then rewinds on a second spool. The upright cylinder in front will indicate when it is time to begin a new line. The pipe we see connecting the three keyboards in the front of the picture is for compressed air, which is used to operate the punch.



Somewhere within this heavy, compact piece of machinery is a little frame, perhaps four inches square, in which are fastened the monotype matrices for our type. And now our paper ribbon is ready. Very odd it appears, with its strange pattern of perforations, not at all suggestive of the interesting story hidden away in it. The operators, however, learn to read the perforated paper as they might a printed page. We cannot see it in this picture, but we know that all those little holes, by allowing just the right machinery to move, are going to guide the big machine so that, one after another, the right matrices will be brought into position to cast a letter. Soon we shall see a queer little finger pushing the newly made type out on to the galley placed to receive it. The machine nearest us already has its galley partly filled.

MAKING THE PICTURES FOR THIS BOOK



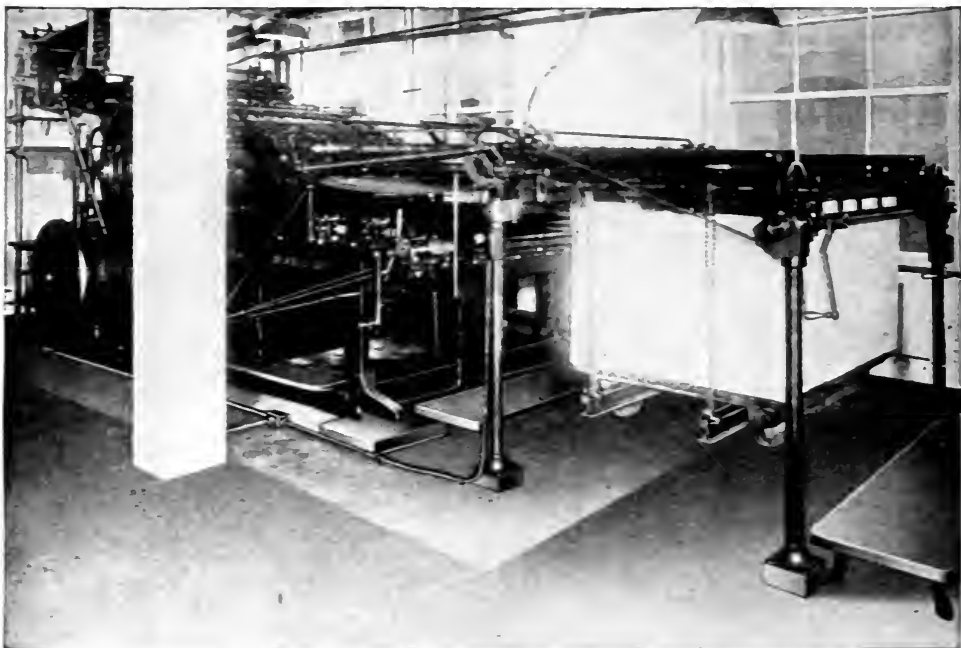
From Groesbeck's *The Process and Practice of Photo-Engraving*.

These illustrations show us how the cuts are made for *The Book of Knowledge*. The photograph having been selected or the artist's drawing accepted, it is photographed by a special camera just as when you have your picture taken. The "original" being photographed is seen on the right with a strong light shining on it. In the back of the camera, in front of the photographic plate is a glass screen, something like a fly screen, but very much finer, which breaks the photograph up into little dots. These dots are so small they can scarcely be seen unless you look at this illustration with a magnifying glass.



These tiny dots are of the greatest importance. After the photograph has been made through the screen, it is printed on a sheet of metal with a solution called an acid resist. This makes each dot impervious to acid and when the metal plate is placed in an acid bath, the metal is eaten away around them, leaving the dots standing up like hills with flat tops. When printing ink is rolled on the tops of these hills and the plate is printed on paper, we get pictures made up of the tiny dots like those on this page. Some pictures, like those on p. 1150, are made without a screen because the artist's drawing was made with lines. Each one of these lines becomes a line of acid resist when such a drawing is photographed and printed on metal, and the spaces between them are etched away by the acid, leaving the ridges only to catch the ink and act as printing surfaces.

THE MACHINES THAT PRINT THIS BOOK



The plates for our book are in position on the printing-press, but before the great machine can be set in motion, many hours must be spent in the careful preparation made necessary by the profuse illustrations. When all is ready, the electric current is turned on. The automatic feeder pushes forward a sheet of paper. Others follow in tireless succession, each, as it progresses, being carefully inspected, and recorded by the counting-machine. At our right is a pile of the large sixty-four-page sheets already printed. An edition of *The Book of Knowledge* weighs very many tons.



Here are other presses at work. We may appreciate their great size by observing the men standing beside them. If the picture could show us the movement of the machinery, we should see the plates being carried to and fro below the cylinder and between a great array of well-linked rollers, leaving their impression, as they pass, on a sheet of paper being carried around the cylinder. These machines print much more rapidly than the old hand-presses which once seemed so marvelous. Many of them are required to keep abreast of the apparently endless stream of paper from the mill.

BOOKBINDING



After the sheets are printed, they must go to the binder's, where they are folded by wonderful machines, sorted into volumes, stitched together, and placed within the covers which serve to strengthen, protect and adorn our books. This picture shows us some of the massive machines used to stamp the gold-leaf lines on the covers. On the bench behind the men are piles of covers waiting to be stamped.



The sections of the book are here being stitched into place on a marvelous machine which does more perfect work than is possible by hand. Later the volumes will be pressed and glued into the covers.

Here is a pile of completely bound books, stacked to dry before going into the finishing press. The work of making our book is almost done, and soon it will be on its way to you.

GREEK ARCHITECTURAL ART



Near the Parthenon, on the northern rim of the Acropolis, is the Erechtheum, the house of Erechtheus and Athena. The Athena of the Parthenon was guardian of the Empire. The goddess of the Erechtheum protected the city. This temple was the centre of religious life in Athens. It was built in Ionic style and was noted for its sculptured flower ornaments and the statues of maidens which take the place of the pillars of the south porch. This temple was completed more than four hundred years before the birth of Christ. But the portions that remain have kept for us much of the beauty of the original building, which is described under Greek and Roman builders.

Photo, courtesy Metropolitan Museum of Art.



Figures of Greek horsemen from the Parthenon frieze.

THE GLORY THAT WAS GREECE

WHEN we turn to the map of the blue, sunshiny Mediterranean Sea, we notice that the most easterly of its three southward-pointing peninsulas is, in fact, a double peninsula. The southern one, called in ancient times the Peloponnesus, is shaped like a mulberry leaf and hangs by its stalk—the Isthmus of Corinth—from the northern one, which springs directly from the mass of the continent. Successive ramparts of mountains shut off the Peloponnesus and a strip of country the other side of the Isthmus from the rest of Europe.

But this whole country of Greece, which is really very small in area, lies open to the enticing sea of many islands, with its fine harbors and easy sailing. This sea was known in old days as the Ægean Sea; the lovely islands themselves are like stepping-stones between Greece and the opposite coasts of Asia Minor.

As we know a polar bear to be the product of fields of snow and ice and long dark days, so can we understand the history of a race better by knowing the geography of its country. The mountains and the sea and the position of Greece in the Mediterranean made the Greeks what they were. Besides the mountain wall to the



Themistocles.

north, the surface of the country is mountainous, and the high mountains, with their narrow valleys and small plains, brought about the growth of small states, which failed to unite. At the same time the mountainous country raised a hardy, brave race, ready to fight and die for home and freedom. Poor soil, with somewhat scanty products, induced moderate habits.

The sea exerted a strong influence upon the development of the race. At the head of the many fine bays and gulfs commercial cities grew up, trading ships were built, and from foreign trade colonies resulted. In this way the Greeks met the ideas and inventions of other peoples, and were stirred to fresh ideas and undertakings of their own.

Greece is in the eastern half of the Mediterranean, and her best harbors look eastward. It was the East that was civilized in those early days, and from the East the Greeks learned much.

When we think of Greece, many, many beautiful stories of gods and goddesses, nymphs and heroes, come into our minds. The beginnings of every country are always vague, and built upon story, because no written

records exist. But there is no country that builds its early days upon such wealth of legend and story as Greece. We can easily see why: as the Greeks were a free and proud people, they liked to think they were descended from gods and heroes. As, also, they believed that everything that had life—plants, trees, waters—had also souls, like themselves, they made stories about them. If they were strong things, like the sea and the heavens and the seasons, they thought of them as gods whom they could influence by prayer or by sacrifice. They were gods because they were greater and stronger than themselves, and, besides, would never die. Then, too, the influence of their wanderings upon the wide seas, their contact with the unchained elements of storm and tide, and their intercourse with so many races, made their minds extraordinarily alert and kept their imaginations working.

To alert minds and vivid imaginations the Greeks, of all peoples, added the art of expressing themselves—their history, legends, ideas—in verse and prose, in painting and sculpture. Thus they left to the world a rich inheritance that has influenced speech, writing and story-telling, building, painting and sculpture, in every civilized country.

THE BEGINNINGS OF GREECE IN STORY AND LEGEND

If a little Greek boy asked where he and the other Greeks came from, he was told this story. Once upon a time the people were so wicked that Zeus, "father of gods and men," resolved to destroy them in a flood. Soon the waters covered all the earth except the peaks of the highest mountains. Only one man, warned by his father Forethought, took refuge with his wife Pyrrha in an ark. After nine days afloat, the ark rested on the summit of lofty Mount Parnassus, and as soon as the waters had gone down, Pyrrha and Deucalion stepped forth on dry ground. They were lonely, and so Zeus in pity told them to cast behind them the bones of their mother. Guessing at his meaning, they threw stones behind them. Every stone that Deucalion threw changed into a man, and every stone that Pyrrha threw changed into a woman. One of Deucalion's sons was named Hellen, and from him all the Hellenes, or Greeks, were descended. Hellen had two sons, Æolus and Dorus, and his brother

had Achæus and Ion. Æolus, Dorus, Achæus and Ion became kings, or "fathers," of the four Hellenic races—the Æolians, Dorians, Achæans and Ionians, who settled along the east coast of the Ægean Sea and on the islands.

This was the Greek way of explaining their origin. We know for certain only that certain peoples, attracted by the aspect of the country, came down from the north and east into the peninsula. They knew nothing of cities, and were grouped in tribes.

THE ORIGIN OF FAMOUS GREEK CITIES AND EXPEDITIONS

Scholars have unearthed the ruins of ancient cities in Asia Minor and in Greece which also date back to the days before history begins. The Greeks have legends to explain the origin and growth of these cities of prehistoric days. They imagined that heroes, the sons of descendants of gods, lived on earth. Stronger and braver than their companions, they protected the communities in which they lived, and founded cities. Thus Tiryns was founded by one Prætus; Mycenæ, by the hero Perseus, who slew the Gorgon Medusa; and Thebes, by Cadmus. The founder of Athens was a monster, Cecrops, who called the city Cecropia. But the goddess Athena and the god Poseidon strove for possession of Cecropia, and as the goddess won the contest, she called the city Athens and the people Athenians. Thereafter Athena became the chief deity and guardian of the state.

From legend grew legend. There was a time when these Hellenic peoples, now become city-dwellers, joined at times in national expeditions for a common purpose. So we have the voyage of the Argonauts in search of the Golden Fleece, and the famous undertaking of the Trojan War. In this latter, Paris, son of Priam, king of Troy, persuaded beautiful Helen, the wife of Menelaus of Lacedæmon, to leave her husband and go with him to Troy. The other Greek princes joined Menelaus, and all gathered their ships and set sail for Troy. For nine long years they besieged the city, and finally Troy was taken by a ruse planned by Odysseus, the wily king of Ithaca. The story of the siege of Troy, or Ilium, is told in two great poems, the Iliad and the Odyssey. Once people thought that everything in the Iliad and the Odyssey was fairy-tale, but in the last half of the

GREEK LIFE SHOWN IN EARLY ART



Figures of goddesses of the sixth century, B.C., found near the Parthenon.



Women playing dice, from Tanagra—in terra cotta.



Warriors from the Temple of Aphaia at Aegina—restored by Thorwaldsen.

nineteenth century the spade of the explorer showed how much truth and history lie behind these songs; and we learn from them much of the life and character of the Hellenes of that age.

Thus the stories explain the few known facts of the early, or prehistoric, days of the Greek people: first, the tribal age, when the people lived simply as agriculturists, followed by the age of cities (often called the Mycenaean, after the most famous city of the time), and, lastly, the epic age, which saw the national undertakings of princes. Then records begin, and we gain from them and from inscriptions more insight into the real history of Greece.

GREEK COLONIES ON THE ISLANDS AND COASTS OF THE MEDITERRANEAN

The Greeks did not long rest contented in the motherland. They did not abandon Greece, but extended her boundaries, first across the islands of the Ægean Sea, whence they passed as over stepping-stones to the coasts of Asia Minor. Of all the Greeks the Ionians of Asia Minor were the most intelligent and most highly civilized. Their cities, afterward known as Smyrna and Ephesus, became very important. Their soil was rich and the climate good, and they learned how to dye and weave, and then to navigate their ships along the coasts and across the sea to Egypt and Italy. Trading is the next step to colonizing, and soon the Greek colonies in eastern Sicily—colonists from Carthage occupied the west—were so large that the early settlers called it "Great Greece." In Italy, also, many Greek colonies were founded.

And the Greeks went north in the Ægean, founded colonies along its west coast, worked the mines, and cut the timber. They sailed into the Hellespont to fish, and founded settlements along its shores. They even pushed on through the straits of the Bosphorus and settled the coasts of the Black Sea. But nowhere did the Greek colonists penetrate far inland. They settled only where the sea breezes blew.

From the small islands of the Ægean the Dorians passed to the larger islands of Rhodes, Cyprus and Crete, and to the farther shores of the Mediterranean, Egypt and Cyrene.

As ships grew larger and the maps showed more—the Greeks were the first map-makers—voyages grew longer and

longer. The Ionians rowed their fifty-oar galleys to the southern coast of Gaul, where they founded Massalia (Marseilles). From the colony at Marseilles, three centuries before Julius Cæsar crossed the English Channel, the ardent old sailor and geographer Pytheas sailed to the distant island of Britain.

THE IONIANS, DORIANS AND ÆOLIANS, THE CHIEF TRIBES, FOUND STATES

The early settlement of the states in Greece itself is a long and difficult story, with many changes of government and much fighting among themselves. Indeed, throughout the whole story of Greece the people never united under one ruler. Incessant and bitter to the very end were the quarrels and jealousies among the states founded by them. Still, shut off in the peninsula by their triple rampart of mountains to the north, they had some centuries free from foreign invasion in which to develop according to their natures and the opportunities of their country.

The chief Ionian state was Athens, with the country round called Attica, that little peninsula which lies northeast of Corinth. In the Peloponnesus was Sparta, or Lacedæmon, the chief Dorian state. To the west of Attica lay Bœotia, with its capital, Thebes, settled eventually by the Æolians, neither so clever as the Ionians nor so brilliant as the Dorians, but more steady and persevering.

THE SPARTANS FORM A MILITARY STATE AND RISE TO POWER

When the Dorians came to the Peloponnesus they found themselves in a difficult position. They were hardy and warlike, and they succeeded in making a number of settlements, but the original inhabitants were ten times as many as themselves. So they were in constant danger of being overcome. Their country, Laconia, was easy to defend, for it had mountains around it on three sides. Still the Spartans, as they came to be called after their chief town, wanted to make sure of never being out-fought by the former inhabitants. They decided that the only way to be sure was to make their whole tribe into an army. A man called Lycurgus framed a set of military laws. These iron laws arranged the lives of Spartans from birth to death as if they were parts of a machine. Baby boys were not allowed to live at all if they were not strong, and those who

SCULPTURE OF FIFTH AND SIXTH CENTURIES, B.C.



A Horse (fifth century).



A restored figure.



A sixth-century Sphinx.



A figure by Pæonius, from the Temple of Zeus at Olympia.



A Man with a Calf.



Mask of Medusa (sixth century, B.C.).



Sixth-century figure.

passed the judges were taken from their mothers when seven years old to be brought up by the state, that they might turn out fine soldiers. They lived in barracks in the hardest and simplest way possible, and were made to endure hunger, fatigue and even thrashing. To this day we say of anyone who endures discomfort and suffering without complaining that he is a Spartan, and a proverb we often use, "Hunger is the best sauce," comes down to us from a Spartan cook who was speaking of the horrid black broth these boys had to take. They learned to read, because that was necessary, but all the rest of their education was meant to teach them *to obey* with cheerfulness, and *to endure* toil, and *to win* battles. After twenty years of this training the Spartan was ready to be a soldier, and he thought any other occupation beneath his dignity.

Thus Sparta not only secured herself, but rose to power. She conquered the neighboring peoples, and from a wandering tribe became, by the sixth century before Christ, the most powerful people in the land.

Sparta's chief rival was Attica. Attica was a peninsula about eighty miles long, bounded by mountains on the north and west. The people were Ionians, and developed along very different lines from the Spartans. Little by little the common people gained liberty, protection and the advantage of written laws. One of the great law-makers was Solon. Cleisthenes, another great leader, brought about many reforms, and induced patriotic spirit in the people and a feeling of unity, so that they were ready for the great Persian armies, so soon to invade Greece. As yet they had no fleet.

THE GREAT OLYMPIAN GAMES FOSTER ART, UNITY AND TRADE

Before we read about the many wars which the Athenians and Spartans were now to fight, we will stop to consider a great Greek institution which did more to give the separate states a national feeling than any other thing. This was the Olympic Games. Among the Greeks there were four national games, but the most famous were held at Elis, in Olympia. No matter if wars were being waged, a truce was always proclaimed for these games, and time allowed for coming and going. Once in four years a vast number of Greeks from all the shores of

the Mediterranean gathered to see the competitions. The great multitude encamped around the sacred inclosure of Zeus, the great god of Olympia. Only free-born Greeks of unmixed blood who swore to obey the rules could enter the games. There were contests in running, leaping, discus-throwing, spear-hurling, wrestling, boxing, and the racing of horses and chariots. A wreath made of olive leaves or a beautiful vase rewarded the victors. When the games were over, sacrifice was offered to Zeus, and feasts began. Such contests promoted art, for the sculptor found his best model among the athletes; they also encouraged national feeling, commerce and peace.

THE GREEK GOVERNMENTS CHANGE FROM KINGS TO OLIGARCHS, THEN TO TYRANTS

While colonizing was going on, most of the Greek states were changing their government. In the early days they had all been ruled by kings. Gradually the power of the kings grew less and less, and power was seized by a few nobles, so that government was then by a few, or what we call oligarchy. The few claimed to be descendants of heroes and to be wiser and better than the common people. The common people did not always agree, and here and there a leader would arise who was called a tyrant because he had power above the laws. The tyrants built beautiful temples to insure the favor of the gods, but they were not always good men, and their power did not last long, for the Greeks loved liberty and did not care to be ruled by the whim of one man. Sparta, indeed, never had a tyrant and was always ready to help another state to get rid of one. In course of time all the tyrants fell, and the states were free.

It was time, for trouble threatened from the East. In Asia Minor the Greek colonists fell under the rule of the great Persian Empire, which, under Cyrus, was pushing ever toward the west. The story of the Persian Wars which now follow is told from the Persian point of view on pages 914-916. We shall not repeat that story here, but look at it from the Greek side.

THE PERSIAN KING PREPARES FOR THE CONQUEST OF GREECE

After the rich colonies of Asia Minor were lost, the Greeks began to fear for their own homeland. To Cyrus succeeded Cambyeses, who enlarged his empire by the conquests of Phœnicia and the

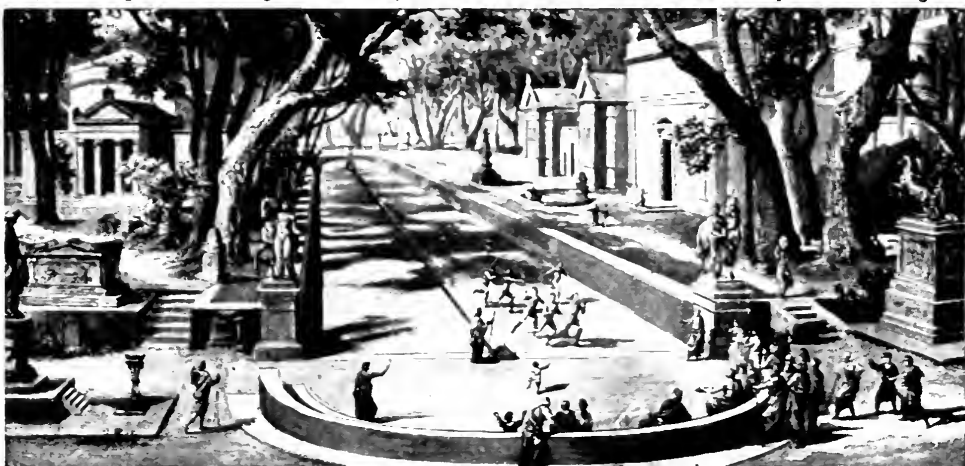
THE FAMOUS GAMES OF THE GREEKS



A leading feature of Greek life was the great Olympian festival, held every fourth year at Olympia, to which athletes, musicians, poets and artists came from all parts of Greece and contended for the simple prizes that took the form of olive crowns. In this picture we see a victorious poet carried in triumph.



Here is the end of one of the great foot races at Olympia. These Olympian games were not idle sport. They were dedicated to Zeus, and represented all that the Greeks held to be most worthy in human life. They were a part of the religion of Greece, and the sternest means were taken to prevent cheating.



So sacred were the Olympian games considered by all the different Greek states that if they were at war, fighting was suspended during the festival, and only resumed after the competitors had returned to their homes. Of all the Greek states none encouraged athletics more than Sparta, whose male citizens were rigorously trained by the state from the age of seven. Here we see the famous Spartan gymnasium.

African coast, including Egypt and the Greek colonies to the west. Darius was the next king, and when he had conquered India, he also turned to the west. The first Persian invasion came to nothing, but another soon followed. Darius did not care to fight just for the sake of fighting, so he sent envoys to the Grecian states to say: "Darius, the great king, demands that you send him earth and water." All nations knew that to yield earth and water was a token of submission. The Athenians, however, threw the king's herald into a pit, and the Spartans threw the one who came to them into a well, bidding them take earth and water thence to their lord. This was not an honorable thing to do, but in their anger the Athenians and Spartans cared not even if they placed themselves beyond the pale of nations. It was a pity that when they brought themselves to such desperate action they could not agree to stand together in the terrible hours so close at hand.

In the summer of 490 B.C. the Persian fleet, carrying some 60,000 men, moved west across the Ægean Sea. The object of the expedition was to punish the Greek states, and particularly Athens, for having helped the colonies in Asia Minor in their revolts. The Persians landed and defeated the Eretrians, and fugitives from the defeated city carried the news to Athens. Fortunately Miltiades, one of the Athenian generals, knew how the Persians fought. First, a runner was dispatched to Sparta to ask help. He reached Sparta, 150 miles distant, the day after starting.

"Men of Lacedæmon," he said, "the Athenians beseech you to hasten to their aid, and not allow that state which is the most ancient in all Greece to be enslaved by the barbarians. Eretria, look you, is already carried away captive, and Greece weakened by the loss of no mean city." The Spartans were willing to help, but they had to wait several days, as a law forbade their going to war before full moon.

THE BATTLE OF MARATHON, ONE OF THE DECISIVE BATTLES OF THE WORLD

Meanwhile the Persians had been advised to land on the plain of Marathon a few miles from Athens, where it was wide and level, and possible to use cavalry. The Athenians attacked the Persians not far from the landing. Miltiades was the

real leader of the Athenians, and he gave the order for the Greeks to charge, and they went at full speed in order to avoid the showers of arrows. The Persians were not ready for a hand-to-hand fight and were driven back on their ships with great loss. They splashed through the shallow water, pursued by the Greeks even up to the gunwales of the ships. Almost unaided—only the Plataeans had come to their help—the Athenians had repulsed the great hosts of Persia. Still there was no time to lose, for the Persian fleet had sailed directly south upon Athens, and the weary troops bestirred themselves again, and by forced marches reached the city and so turned away the Persians, who were looking for a surprise attack.

The battle of Marathon was perhaps the most important battle yet fought in the history of the world. It was not important for the size of the forces engaged—though the Athenians repulsed an army ten times the size of theirs. Its value lay in that it was a victory of Europe over Asia—Europe, where men built states upon the ideas of liberty and freedom, as against Asia, where men built empires upon slavery, submission and tyranny.

The heroes of Marathon were buried where they fell; a mighty mound of earth was raised over their graves and ten stately pillars set thereon bore the name of every Athenian that had perished. The columns have fallen, their marble has crumbled to dust, but the earth mound remains, and there you and I may do honor to these ancient heroes in Greece to-day.

THE ATHENIANS UNDER THEMISTOCLES BUILD SHIPS

Some of the leaders of the Athenians felt certain that the Persians would come again. Among them was a man called Themistocles, who said that if the Athenians were to defend themselves successfully, they must learn to fight on sea as well as on land. He was opposed by a man called Aristides, surnamed "the Just." But Themistocles triumphed, and using the revenue from the silver-mines of Laurium, built two hundred triremes (vessels with three banks of oars).

Darius, king of Persia, was very angry when his army returned defeated, and he determined that a third attempt should end in victory. Accordingly he devoted three years to the most elaborate prepa-

GREECE TRIUMPHANT OVER PERSIA



Xerxes the Persian came to conquer Greece with a huge fleet of 1,200 large ships and 3,000 smaller ones, while the Greeks had only 366. So confident was Xerxes of crushing the Greek fleet at Salamis that he sat on a lofty throne to see their defeat; but the Persians were completely beaten. This battle took place in the year 480 before Christ, a few days after the fight at Thermopylae. In this picture, by Ferdinand Cormon, we see how enthusiastically the Greek victors were welcomed by their friends after the battle.



A century and a half after the Greeks at the Battle of Salamis had turned the tide of Persian dominion away from the shores of Europe, a decisive battle was fought in old Asia itself, where a small band of hardy men from Greece under their young Macedonian leader, Alexander the Great, defeated a huge Persian host under King Darius. This picture shows the battle, on a broad plain near Arbela, north of Babylon, in the year 331 before Christ.

rations. Just as things were completed Darius died. His son Xerxes, after reconquering Egypt, which had revolted, led a huge army into Asia Minor in 481 B.C. He crossed the Hellespont on bridges of boats and brought his great hosts down through Thessaly.

Meanwhile the Greeks were watching his movements. Some states decided to yield, and sent earth and water to the Persian king. Others were jealous as to the command and held aloof. Finally Athens, Sparta, Plataea and one or two others saw they could hope for no strength but their own. Athens sent messengers to the oracle at Delphi. The answer was as confusing as the oracles usually were, and the only statement that seemed clear was that the enemy would capture Athens. Still one line, though obscure, held out some hope: "Safe shall the wooden walls continue for thee and thy children."

THE HEROIC FIGHT IN THE PASS OF THERMOPYLÆ

While the Athenians debated, the Persians came on, and soon all Thessaly yielded to them. To prevent central Greece from doing likewise, Leonidas, king of Sparta, with 300 Spartans and about 6,000 men from different tribes was sent to hold the narrow pass of Thermopylæ. (It was the time of the Olympian games and the festival of Apollo, and more Greeks could not go.) Here only a narrow road was left between the mountains and the water. Xerxes had to keep close to his fleet, and this was the only place near the sea where he could get through the mountains.

The Persians failed to carry Leonidas' position, for their numbers did not count in the narrow pass. The discipline and valor of the Greeks might have held the Persians at bay for an indefinite time had it not been for treachery. A Greek told Xerxes of a path leading over the mountains and around the pass to the back of the heroic defenders. Most of the allies withdrew while there was still time, but Leonidas and the Spartans prepared for a death-struggle. When spears broke, they fought with swords, with teeth, with fists and stones, till none remained to strike a blow. The dead were buried where they fell, and above the three hundred was placed this epitaph: "Stranger, tell the Lacedæmonians that we lie here in obedience to their laws."

THE BATTLE AT ARTEMISIUM WAS INDECISIVE

Meanwhile the Greek fleet was trying to prevent the Persian ships from entering the Euripus, the strait between Eriboe and the mainland. For three days the fight continued, the Persians trying to press through the strait at Artemisium and the Greeks holding them back. On the evening of the third day came news of the battle at the Pass of Thermopylæ and the advance of the Persians upon Athens. It no longer availed to hold the strait, and the Greek ships sailed to Salamis.

As Xerxes advanced through central Greece nearly all the states submitted and sent troops to swell his army. At Delphi he turned aside for the rich treasures of the temple of Apollo, but a great thunderstorm arose, and great crags came hurtling down from Mount Parnassus upon the enemy. So Apollo defended his shrine.

THE BATTLE OF SALAMIS A GLORIOUS GREEK VICTORY

Soon the Persians fell upon Athens, which they sacked and ruined. It was deserted, for Themistocles had persuaded the Athenians that the "wooden walls" meant ships, and therein they had taken refuge. He now determined that the naval battle should be fought in the Bay of Salamis, and meeting great opposition to his plans among the Greeks, advised Xerxes to block up the Greeks in the bay. Thus, compelled to fight, the new Greek fleet, faced with a fleet twice as large, fought their way to glorious victory. All day long the battle raged, but the enemy's ships, closely crowded together, got in one another's way and were unable to manœuvre. Sunset gleamed on wrecked ships with broken oars and rudders. What the Greeks could not sink they chased out of the straits.

Xerxes feared for his bridge at the Hellespont and withdrew, leaving his general, Mardonius, with about 300,000 men to complete the conquest of Greece. This great force was scattered at the battle of Plataea some months later, and Mardonius was slain. What was left of the Persian ships had gone to keep watch over the Ionian colonies. In answer to a plea from them for help the Greek fleet sailed across to Ionia. They expected a naval battle, but the Persians had gone ashore, and so the Greek crews landed

THE BEAUTIFUL PARTHENON



The Acropolis was the glory of Athens, and the Parthenon, that crowns its heights, was the glory of the Acropolis. It has been called the world's finest building on the world's finest site, and by common consent this verdict has been agreed to. It is now in ruins, but here we see it in its glory.



The Parthenon was a temple of the goddess Athena, and, inside as well as out, was beautifully adorned with sculptures. But the greatest treasure of the Parthenon and of all Athens was the colossal statue of the goddess Athena in ivory and gold, the work of Phidias, one of the world's greatest sculptors.

at Mycale, where they routed a greatly superior force. It was the end of the Persian threat. Never again did her armies set foot on Grecian soil.

ATHENS BECOMES THE LEADING STATE AND FOUNDS THE DELIAN LEAGUE

Athens had done more to repulse the Persians than any of the other states. It was therefore only to be expected that after the Persian Wars she would become the leading state among the Greeks. Themistocles knew that the other states would be jealous, so he persuaded the Athenians, in rebuilding their city, to surround it by a wall. The Spartans were not pleased and sent to the Athenians to remind them that Sparta had no walls. Nevertheless, the Athenian wall was built, and the city itself rebuilt, and long walls erected between the harbor of Piræus and the capital. Soon after this Aristides the Just founded the Delian League, with the object of freeing the Greek cities that were still in the hands of the Persians and of keeping the Ægean Sea free from pirates. At first the treasury to which all the states contributed was at Delos, but later it was moved to Athens, who was the leader in the association and gained more and more power in it. It was some time before the other members realized that Athens was becoming richer and more powerful and they poorer and feebler all the time. Then, one after another, they attempted to leave the League, but Athens would not permit this and obliged them to pay even larger tribute. So it was that the Delian League became an empire, with Athens as its ruler.

THE ATHENIANS BUILD THE LONG WALLS, BUT ARE INVADED

Sparta would have done something to prevent this if she could, but she was brought low by an earthquake, a revolt of the Helots, or former inhabitants, and by a rising of the Messenians, a neighboring subject people. It was soon apparent, however, that the rivalry between the two states was so bitter that the safest thing for Athens to do was to make herself as strong as possible. Under a leader, Pericles, she therefore made alliances throughout Greece, even with the people in the Peloponnesus, where Sparta exercised her influence. Soon the influence of Athens was supreme, and as head of the Delian Empire she controlled the islands and cities of the Ægean Sea.

Mighty on land and on sea, she built what were known as the Long Walls between Athens and the ports of Phalerum and Piræus. They were sixty feet in height and wide enough for two chariots abreast. So long as Athens held these she could not be cut off from the sea. Then troubles came. Her power had stirred up enemies: several states revolted, and a Spartan army invaded Attica. Fortunately Athens had a wise leader in Pericles. He made a peace, called after himself the Peace of Pericles, which was to last for thirty years. By its terms Athens had to give up all she had gained in the Peloponnesus, and with that the hope of one day controlling all Greece.

THE AGE OF PERICLES WAS A GOLDEN AGE FOR ATHENS

As long as there was peace Pericles set to work to improve Athens, which he wished to make the "School of Hellas." He thought that one way for the Athenians to become the chief people in Greece was for them to gain the intellectual leadership. One of his means was to create beautiful surroundings, and to his day belong some of the most beautiful examples of Greek architecture, the Parthenon, a temple to Athena (perhaps the most nearly perfect piece of architecture ever created), the Erechtheum, which temple was the centre of the religious life of Athens, and the Theseum. In the Age of Pericles lived Phidias, the most eminent sculptor of all time. He directed the making of the reliefs of the Parthenon. One of his most famous works was the Zeus of Olympia. It was so wonderful that the Greeks had a saying for a man who died before going to Olympia: "That man was truly unfortunate, for he died without seeing the Olympian Zeus."

Æschylus, the first great composer of dramas, lived also at this time, and Sophocles, of whom we have but seven of his hundred plays. Euripides was a third great tragic poet. Herodotus was at work on his history, which tells us what we know of the Persian Wars. There is a story that on one occasion he read his history at the Olympian Games, and among his hearers was a boy of fifteen who, moved to tears by the great applause, said: "I, too, will be a historian." This boy, Thucydides, became as famous as Herodotus. As Pericles was the patron of art and literature, so was

he also the friend of philosophers. Among his teachers was Anaxagoras, the first philosopher to teach that mind rules the universe.

THE PELOPONNESIAN WARS REDUCE ATHENS

The Age of Pericles is counted as lasting only from 445 B.C. to 431 B.C., because, although it was agreed that the peace should last for thirty years, it was only fifteen when it was broken. Sparta and her Peloponnesian allies were on one side, and Athens with her allies on the other. The Peloponnesians were mostly Dorians and agricultural. The Ionians in the Athenian Empire were commercial. Both Athens and Sparta were rivals for the leadership of Greece.

The war lasted for twenty-six years, with occasional truces. During its course Athens lost her Sicilian colonies, and Sparta made a treaty with Persia against Athens, and together the Spartan leader Lysander and the Persian Cyrus overcame the Athenians in the battle of Ægospotami. Athens had to level her Long Walls, give up all but twelve ships, and agree to obey Sparta on land and sea.

The downfall of Athens was as unfortunate for the Greeks of the west as for those of the east. The power of Athens had kept the Persians and Carthaginians at bay. Now the Greek colonies were attacked in Sicily and so weakened by the fighting that they fell an easy prey to Rome, just beginning to arise in power upon the horizon.

SPARTA ASSUMES THE LEADERSHIP IN GREECE

Sparta succeeded to the position that Athens had had in Greece, but she enslaved the cities that she claimed to be setting free from Athenian tyranny, and to Athens especially she showed great severity. It was at this sad time that Socrates died. He had fought fearlessly for Athens, but he would not sacrifice his ideals of right to the politics of the time, and so fell a victim to popular disfavor and was condemned to die. When the cup of poison was brought to him, he drank it as quietly as if it had been wine. Plato, one of his followers, was present during the last days, lived half a century after the death of his beloved teacher, and became even more famous as a philosopher. Another disciple was Xenophon, just then returning from the expedition of the Greeks into Persia.

After the Peloponnesian War was over, Cyrus of Persia borrowed about 13,000 Greeks to try, with some Asiatic troops, to take the throne from his brother Artaxerxes. With these forces the prince marched into the very heart of the Persian Empire and met his brother in battle at Cunaxa, near Babylon. Cyrus was killed and his Asiatics retired from the field, but the little Greek force was victorious over the king's great army. Then, under a truce, the Greeks began their retreat. Their generals were slain by a trick; they appointed new leaders. They were beset on all sides and traveling through strange lands, yet they maintained their discipline. Xenophon, the historian, was the hero of the retreat, and one day he heard a great shout from the men in the vanguard. He sprang upon his horse and galloped up the hill. Far to the horizon lay a line of shining water; "The Sea, the Sea!" shouted the soldiers, and the great wave of sound swelled and rose in the sweltering air. Within three days they had reached the Greek city of Trebizond and safety. Here the people cared for them and celebrated games in honor of the gods. Xenophon himself wrote an account of the retreat of the Ten Thousand, who had fought their way a thousand miles through enemy country to reach the sea.

This expedition of the Greeks had two important results: it showed the Greeks that the huge, unwieldy empire of Persia was extremely open to attack; it brought about immediate war between Persia and Sparta. The Spartan king successfully resisted the might of Artaxerxes and freed the Greeks of Asia Minor from the Persian yoke. He was planning to go on against Persia itself when the Persians induced several of the states, including Corinth and Athens, to combine against Sparta. This was the beginning of the Corinthian War. At its close Sparta made a shameful treaty with Persia, and backed by her support, became a tyrant in Greece.

But the Thebans defeated the Spartans in battle with a smaller force, and thus the Spartans lost the leadership of Greece. In the Peloponnesus the wildest confusion arose. For a while Thebes was regarded as the chief state of Greece, but could not maintain such a position, though the Thebans had some continued successes under their great leader, Epam-

inondas. When he died, it was not the long-dreaded Persians who were now to be feared as possible conquerors of the disunited states of Greece. The danger came from an unexpected quarter—from Macedonia, on the northern and western shores of the Ægean Sea.

THE DANGER THAT THREATENED THE GREEK STATES FROM THE NORTH

The Macedonians were in race a mixture of the Greeks and the less civilized tribes whom they called barbarians. They had long had their own kings, but little heed was paid to them by their southern neighbors. It was when a very clever and ambitious king, Philip, came to the Macedonian throne that danger began to threaten.

As a boy he had been taken as a hostage to Thebes. There he had learned how the Greeks lived and how they carried on war. When he began to wear the crown of his father, he drilled and improved his army, annexed the barbarian countries around him, and, by playing his game with wonderful craft and skill, took advantage of the weakness and quarrels of the Athenians, Spartans and Bœotians. In the end he won the great aim of his life, the headship of the Greek states.

Demosthenes, the fine orator, who saw through his plans and wiles, was his chief enemy. In the assembly at Athens he thundered forth again and again in stirring speeches that have come down to us, and which we call philippics, trying to persuade his countrymen to change their ways before it was too late.

THE DARK DAY WHEN THE FREEDOM OF GREECE PASSED AWAY FOREVER

In the final battle of Chæronea, 338 B.C., Demosthenes, though forty-seven years of age, fought in the Athenian ranks. Imagine his feelings on the evening of that awful day. The Athenians lost 1,000 men on the field, and 2,000 were prisoners in Philip's hands. The flower of the Theban army died to a man where it stood. The freedom of Greece was gone, and the outward glory of Athens was laid in the dust. Great as Philip was, for he had raised Macedonia from being a small half-barbarous state to the headship of Greece, he had a still greater son, Alexander.

Demosthenes proposed and carried a vote of thanksgiving when the news came of Philip's death. But Alexander crushed

all hopes of freedom in Greece, and quickly showed his wonderful military genius in a campaign in Thrace. And then he set out on larger expeditions, till all the known parts of Asia and Africa were his, and he only longed for more worlds to conquer.

After his early death there was long fighting and confusion as to who should succeed to the great empire that he had built by conquest, and at length three separate kingdoms arose on its ruins.

The Greeks rose against Antipater, the governor of Macedon, and drove him back into Thessaly, where he was besieged in Lamia. Demosthenes, who had been exiled, returned and roused his countrymen to a high pitch of loyalty and desire for freedom. But the attack on Lamia failed. The Greek states could not remain united, and Antipater made separate treaties with each of them. Athens had to receive a Macedonian garrison. Demosthenes fled from the city and soon afterward took poison to escape capture.

HOW "CAPTIVE GREECE LED CAPTIVE HER PROUD CONQUEROR"

About a hundred years later, 168 years before Christ, Macedonia was made a Roman province. Twenty years after that, Corinth, the busy trading Panama of Greece, was taken, and Greece itself was made subject to Rome. But, as one of the Roman poets has said, "Captive Greece led captive her proud conqueror."

Rome had for years been learning from the art and literature of Greece, and when the conquest came, celebrated by long triumphant processions in Rome, instead of the usual train of vanquished kings and queens, strange beasts, and a great show of barbaric splendor, there passed before the Roman people the grand, silent forms in marble and bronze, the beautiful art treasures of Greece, torn from shrines and temples to adorn Roman cities, and to serve as models to the whole world.

Alexander had done his share in showing Greece to Asia, but it was chiefly by means of the Roman arms that the knowledge of Greek art and Greek learning was carried beyond the narrow borders of the little peninsula. In fact, Greece then became a "country without borders," and her wonderful influence and power are felt in a hundred ways all over the world in the present day.

THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 1191.



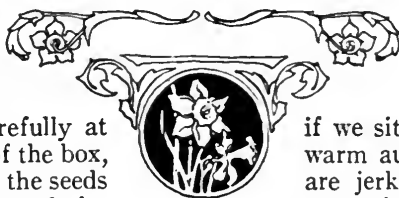
Seeds of the hawkweed being distributed by the wind.

THE FLOWER'S WONDERFUL SEED-BOX

WE have seen that the fruit of a plant is its wonderful seed-box. Let us now look more carefully at the precious contents of the box, and see especially how the seeds are sown and distributed far and wide over the earth.

Inside the flower's seed-box, the ovary, there are ovules, and these ovules are *possible* seeds. The ripe ovule is the seed; but we do not get at the heart of the matter till we are clear that the seed contains a very young plant, the embryo. Besides this very young plant, which will develop into a seedling, there is a store of condensed food, as in a grain of wheat, and there are protective seed-coats, or husks. The store of food, which is a sort of legacy, may be outside the young plant, though within the seed-coats, or it may be in the young plant itself, as we see clearly in peas or beans.

The simplest way in which seeds are sown is by the cracking and bursting of the seed-boxes. Then the seeds tumble out, as we may see in the ripe pod of a pea. The liberated seeds may be washed away by water, or swept along the ground by the wind, or buried in an earthworm's hole. Seeds lying loose may be collected by ants and stored in an ant-hill. But an ant may lose the seed it is carrying, and this is another way in which seeds are scattered.



In some cases the seed-box bursts explosively, as we may both hear and see if we sit among the gorse on a warm autumn day. The seeds are jerked out to a little distance, for the drying of the wall

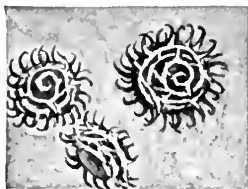
releases certain springs in a jack-in-the-box fashion. In the balsam, or jewel weed, whose Latin name is *Impatiens noli-me-tangere* (touch-me-not), the jerking out of the seeds is very effective indeed.

In this case five valves suddenly roll up like watch-springs and sling the seeds out; the force is due, not to a sharp release of dried-up fibres, but to a layer of living cells very rich in water which expand suddenly when the trigger is pulled by touching the tip of the ripe fruit. The most famous explosive fruit is that of a tropical plant called *Hura crepitans*. It bursts with a report like a pistol-shot and scatters the seeds for several yards. Then there is the squirting Italian cucumber, where the fruit bursts and scatters the seeds along with its *liquid* contents.

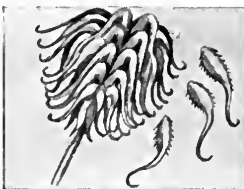
The great advantage of explosion over simple breakage is that the seeds are thrown out beyond the immediate neighborhood of the parent plant. Otherwise there would be unwholesome overcrowding among the seedlings.

Another way in which seeds are scattered is by the fruits becoming attached

HOW THE WIND HELPS TO CARRY ON THE



Medick seeds with hooks for catching in wool.



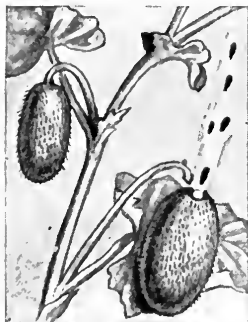
Hooked seeds of the avens.



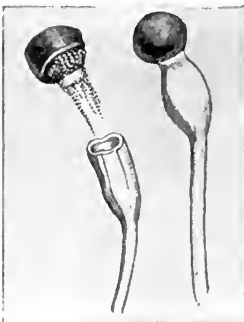
Hooked seeds of the orlaya.



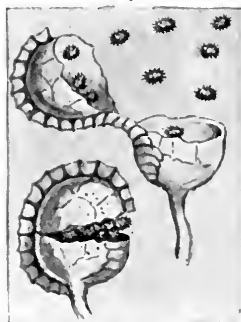
Cyperus-like sedge with spiked seeds.



The explosive squirting cucumber seed.



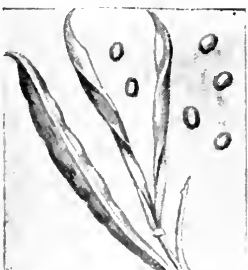
Philobolus fungus spores scattered by explosion.



Male fern's spore case bursts, scattering spores.



Common wood-sorrel expels its seeds.



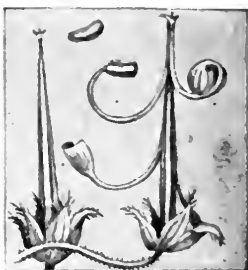
Spring bitter vetch seeds springing out.



Violet seeds thrown out from the pods.



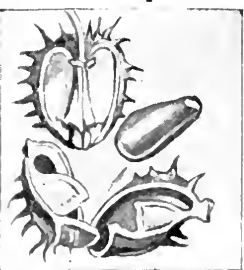
Cuckoo flower's seeds springing out.



Expulsion of crane's bill seed.



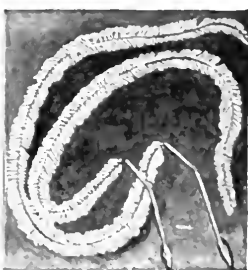
Germander's seed hurled away.



Castor-oil plant throws out the seed.



Stork's bill seeds parachute to earth.



Feather grass's feathered seeds.



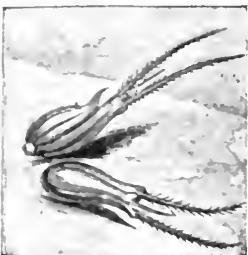
Spiked goat-grass seeds work along the ground.



Starry scabious seeds that hop along the ground.



Starry clover's seed that creeps along.

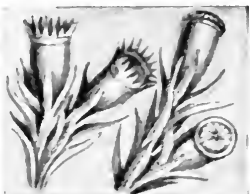


Hard-grass seed that works its way along.

RACE OF FLOWERS THROUGHOUT THE WORLD



Trichia fungus with spores exposed to wind.



Griminia moss with spore capsules open and closed.



Moonwort with spore case closed and open.



Split moss with spore capsule closed and open.



The winged seed of the ash.



Linden tree's winged seeds.



Common hop seeds falling.



Cotton-grass seeds flying off.



Dandelion seeds take flight.



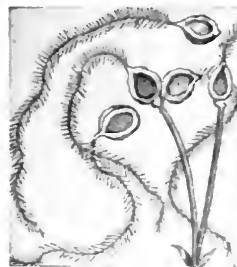
Flight of Cat-tail seeds from ripe head.



Swamp dogwood's winged seeds.



Feathered seed of mountain avena.



Feathered seed of virgin's bower.



Bush grass seeds take flight.



Winged seeds of tree of heaven.



Seed keys of the maple, single and double.



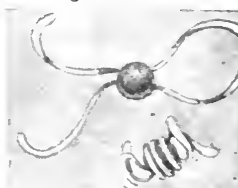
Winged seeds of artedia fully ripe.



Two-winged seed of triopteris.



Winged seeds of opopanax with broad sails.



Horsetail spores with spirals, rolled and unrolled.

to passing animals, such as rabbits and sheep. They cling for a while by means of roughnesses, hooks or bristles, and then fall off or are rubbed off. This is true of agrimony, cockleburrs, some grasses and stick-tight, or "beggar ticks." In nutlet fruits and others which do not liberate the seed till it sprouts in the ground, there is very little practical difference between the fruit and the seed which fills it. Therefore we may include among the different kinds of seed-scattering the attachment of the dry fruit to the fur or fleece of animals.

THE WAY IN WHICH THE THRUSH SPREADS THE MISTLETOE SEEDS

The seeds of water-plants may be carried on the feet of birds from one pool to another, and a clodlet formed on a bird's foot on a plowed field may contain many seeds which will be sown elsewhere. Thus Darwin got eighty-two seeds to sprout from a ball of earth that had formed on a partridge's foot, and that was after the ball had been kept dry for three years!

A peculiar kind of sowing is seen in the mistletoe. The white berry contains one seed imbedded in glue-like pulp which hardens on exposure to air. Now, the thrush likes the pulp, but it does not like the seed. Yet it is a little difficult to reject the seed when swallowing the fruit, and the seed often adheres to the bird's bill—whereupon the thrush cleans it off by wiping its bill on a branch! In this strange way the seed is sown; it remains glued to the branch till genial spring weather comes; then it sprouts and fixes itself more firmly. It is not till the second spring that it begins to grow vigorously. In the case of one of the tropical mistletoes the seeds are sometimes smeared by birds on to telegraph wires, where, of course, they die!

THE SEEDS WITH PARACHUTES FOR MAKING FLIGHTS IN THE AIR

It should also be noticed that when a thrush swallows the whole fruit, the undigested seed may be passed out none the worse for its journey down the food-canal, and this would be another kind of sowing. But it is not the usual one.

What is unusual in the case of the thrush and the mistletoe berry is common among other fruit-eating birds and among fruit-eating mammals. The fruit is swallowed, its soft parts are digested, the stones or seeds are unharmed, and they are passed out again, it may be miles

from the place where they were swallowed.

On the other hand, there are many birds and mammals that are able to digest the seeds they swallow. This is of some practical importance for man. A creature digesting the seeds of weeds is helping the farmer by checking the spread of pests. A creature that swallows the seeds and passes them out again undigested and unharmed is plainly scattering abroad what is injurious.

One of the most important agencies in seed-scattering is the wind, and this applies particularly to small fruits or seeds which have parachutes, or floats, of some sort. The fruit of the maple is a nutlet borne at the end of a long blade-like parachute. When it is torn from the tree by a gust of wind, it sinks with a beautiful twisting motion which often carries it far beyond the tree's shadow. If we throw it up into the air again, we can watch its peculiar twisting flight as it sinks, and we can observe that it does not return to us.

THE SEED THAT FLIES THROUGH THE AIR LIKE A BUTTERFLY

There are many other fruits with parachutes, such as elm and ash, and in some cases the parachute belongs to the seed itself. Thus the seed of a bignonia has broad wings and is so finely balanced that it "floats lightly along through the air in an almost horizontal course, and with the motion of a butterfly."

Very useful, too, is the down of fine hairs seen on many small fruits and seeds. Thistle-down and dandelion-down are fine examples. The feathery plumes of the fruits of traveler's-joy, or old-man's-beard, often entangle in long lines which float through the air with a beautiful wavy motion. The fruits or seeds are borne like gossamer-spiders on the wings of the wind.

They are scattered far and wide. The down makes it more difficult for them to sink in the air and it gives the favoring breeze something to grip. In the case of a very light fruit, like that of the groundsel, it has been suggested that the sun's rays striking on the tuft of white hairs and warming the immediately surrounding atmosphere may produce a small eddy which lifts what is certainly "as light as gossamer" even when there is no breeze. They say that the groundsel had their original headquarters on the Andes, from where they have spread—thousands of different kinds—over the whole earth;

and part of the success of this journeying must surely be due to the parachutes.

What strikes one is the great variety of ways in which the sowing of seeds is brought about in nature. Coconuts are floated by the currents of the sea to distant islands—what a contrast between this and the groundsel's aerial journeys! The fruit-stalks of some wall-plants bend away from the light and poke the seed-

as it goes; and the same sort of thing occurs in the grass called spinifex and in some other cases—what a contrast between this and the liberation of seeds from neatly made little holes at the top of a poppy-head!

The meaning of the great variety is simply that plants have in different ways counteracted their great handicap—that they are fixed to one place. Those have



Seeds of the balsam expelled from their case.



The burst seed-cases and the flying seeds of the monkey's-dinner-bell.



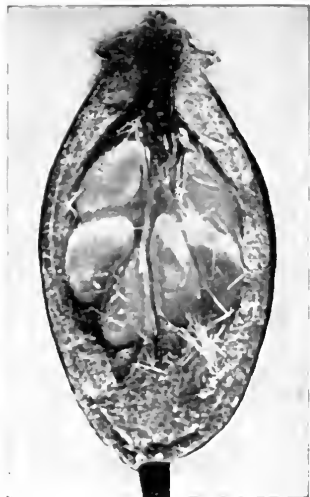
Bursting seed-cases of the thorn-apple.



A section through an ivory-nut.



The long and spiky seed-cases of eschscholtzia.



A much enlarged section of the thorn-apple.

THE WONDERFUL WAY IN WHICH NATURE PROTECTS THE SEEDS AND SENDS THEM OUT INTO THE WORLD

box into a crevice of the wall—what a contrast between this and the way the seeds of the wild cherry are sown by birds! The fruit-stalk of the peanut bends to the earth and pushes the fruit into a hole—what a contrast between this and the balsam's impatient explosion! The rose-of-Jericho of the desert curls its dry branches into a ball which is torn up by the wind and rolled along the ground for great distances, scattering the seeds

been most successful which have been best able to scatter their seeds. Although many seeds come to nothing, wide scattering increases the chances of finding suitable and less crowded places where they may sprout and grow; where the seedling may become a plant which will have room to spread out its leaves and flowers, and nourishment to develop its fruits and seeds. So the chain of plant life lengthens.

THE NEXT STORY OF PLANT LIFE IS ON PAGE 1275.

ALICE FALLING DOWN THE RABBIT-HOLE



A white rabbit with pink eyes hurried past Alice, remarking, as he drew his watch from his waistcoat pocket, "Oh dear! Oh dear! I shall be too late!" This aroused the curiosity of the little girl. It was odd to see a rabbit with a waistcoat and a watch! So she ran after him, and, without thinking, pursued him into the rabbit-hole. But he kept ahead, and presently she found herself falling down a great well, which seemed to go right down to the middle of the earth, and had queer cupboards and furniture all the way down. What happened when she and the rabbit got to the bottom we shall learn in good time.

The Book of STORIES

LEWIS CARROLL'S FAMOUS STORY

AS you will be able to read about Lewis Carroll on page 3198, we need say nothing about the author of *Alice's Adventures in Wonderland*. We are going to read the story itself. It is not possible to print here every word of it, to tell all the adventures at full length; but we have taken the story as a whole, and where parts of the original have had to be left out, these have been retold very briefly, so that the reader can follow the adventures of Alice from beginning to end. Excepting such passages, the story is told in the words of its author. It has been specially illustrated for us by the famous artist Harry Furniss, who was a friend of Lewis Carroll, and drew the pictures for two of his other fairy tales. As Mr. Furniss knew the author's ideas of how his stories should be illustrated, these charming pictures, drawn according to these ideas, rank high among the many illustrations of *Alice's Adventures*.

ALICE IN WONDERLAND

ALICE was beginning to grow very tired of sitting by her sister on the bank, and of having nothing to do; once or twice she had peeped into the book her sister was reading, but it had no pictures or conversations in it, "and what is the use of a book," thought Alice, "without pictures or conversations?"

So she was considering in her own mind (as well as she could, for the hot day made her feel very sleepy and stupid) whether the pleasure of making a daisy-chain would be worth the trouble of getting up and picking the daisies, when suddenly a white rabbit with pink eyes ran close by her.

There was nothing so very remarkable in that; nor did Alice think it so very much out of the way to hear the Rabbit say to himself: "Oh dear! Oh dear! I shall be too late!" (when she thought it over afterwards, it occurred to her that she ought to have wondered at this, but at the time it all seemed quite natural); but when the Rabbit actually took a watch out of his waistcoat pocket, and looked at



it, and then hurried on, Alice started to her feet, for it flashed across her mind that she had never before seen a rabbit with either a waistcoat pocket or a watch to take out of it, and overcome

with curiosity, she ran across the field after him, and was just in time to see him pop down a large rabbit-hole under the hedge.

In another moment down went Alice after him, never once considering how in the world she was to get out again.

The rabbit-hole went straight on like a tunnel for some way, and then dipped suddenly down, so suddenly that Alice had not a moment to think about stopping herself before she found herself falling down what seemed to be a very deep well.

Either the well was very deep, or she fell very slowly, for she had plenty of time as she went down to look about her, and to wonder what was going to happen next. First, she tried to look down and make out what she was coming to, but it was too dark to see anything; then she looked at the sides of the well, and noticed



"Oh dear! Oh dear! I shall be too late!" said the White Rabbit.

that they were filled with cupboards and book-shelves. Here and there she saw maps and pictures hung upon pegs. She took down a jar from one of the shelves as she passed; it was labeled ORANGE MARMALADE, but, to her great disappointment, it was empty. She did not like to drop the jar for fear of killing somebody underneath, so managed to put it into one of the cupboards as she fell past it.

"Well," thought Alice to herself, "after such a fall as this, I shall think nothing of tumbling downstairs. How brave they'll all think me at home! Why, I wouldn't say anything about it, even if I fell off the top of the house." (Which was very likely true.)

Down, down, down. Would the fall *never* come to an end? "I wonder how many miles I've fallen by this time?" she said aloud. "I must be getting somewhere near the centre of the earth. Let me see: that would be four thousand miles down, I think—" (for, you see, Alice had learnt several things of this sort in her lessons in the school-room, and though this was not a *very* good opportunity for showing off her knowledge, and there was no one to listen to her, still it was good practice to say it over). "Yes, that's about the right distance—but then I wonder what latitude and longitude I've got to?" (Alice had not the slightest idea what latitude was, or longitude either, but she thought they were nice grand words to say.)

Presently she began again speaking to herself.

"I wonder if I shall fall right *through* the earth? How funny it'll seem to come out among the people that walk with their heads downwards! The Antipathies, I think" (she was rather glad there was no one listening this time, as it didn't sound at all the right word); "but I shall have to ask them what the name of the country is, you know. Please, ma'am, is this New Zealand or Australia?" And she tried

to curtsy as she spoke. Fancy *curtseying* as you're falling through the air! Do you think you could manage it? "And what an ignorant little girl she'll think me for asking! No, it will never do to ask; perhaps I shall see it written up somewhere."

Down, down, down. There was nothing else to do, so Alice began talking again. "Dinah'll miss me very much to-night, I should think." (Dinah was the cat.) "I hope they'll remember her saucer of milk at tea-time. Dinah, my dear, I wish you were down here with me. There are no mice in the air, I'm afraid, but you might catch a bat, and that's very like a mouse, you know. But do cats eat bats, I wonder?" And here Alice began to get rather sleepy, and went on saying to herself in a dreamy sort of way: "Do cats eat bats? Do cats eat bats?" and sometimes, "Do bats eat cats?" for, you know, as she couldn't answer either question, it didn't much matter which way she put it. She felt that she was dozing off, and had just begun to dream that she was walking hand in hand with Dinah, and was saying to her very earnestly: "Now, Dinah, tell me the truth, did you ever eat a bat?" when suddenly, thump! thump! down she came upon a heap of sticks and dry leaves, and the fall was over.



"What a curious feeling!" said Alice. "I must be shutting up like a telescope."

Alice was not a bit hurt, and she jumped up on to her feet in a moment. She looked up, but it was all dark overhead; before her was another long passage, and the White Rabbit was still in sight, hurrying down to it. There was not a moment to be lost. Away went Alice like the wind, and was just in time to hear him say, as he turned a corner: "Oh, my ears and whiskers, how late it's getting!" She was close behind him when she turned the corner, but the Rabbit was no longer to be seen. She found herself in a long, low hall, which

was lit up by a row of lamps hanging from the roof.

There were doors all round the hall, but they were all locked, and when Alice had been all the way down one side and up the other, trying every door, she walked sadly down the middle, wondering how she was ever to get out again.

Suddenly she came upon a little three-legged table all made of solid glass. There was nothing on it but a tiny golden key, and Alice's first idea was that this might belong to one of the doors of the hall; but, alas! either the locks were too large, or the key was too small, for, at any rate, it would not open any of them. However, on the second time round she came upon a low curtain she had not noticed before, and behind it was a little door about fifteen inches high. She tried the little golden key in the lock, and, to her great delight, it fitted.

Alice opened the door, and found that it led into a small passage, not much larger than a rat-hole. She knelt down and looked along the passage into the loveliest garden you ever saw. How she longed to get out of that dark hall, and wander about among those beds of bright flowers and those cool fountains, but she could not even get her head through the doorway; "and even if my head would go through," thought poor Alice, "it would be of very little use without my shoulders. Oh, how I wish I could shut up like a telescope! I think I could, if I only knew how to begin." For you see, so many out-of-the-way things had happened lately that Alice had begun to think that very few things indeed were really impossible.

There seemed to be no use in waiting by the little door, so she went back to the table, half hoping she might find another key on it, or, at any rate, a

book of rules for shutting people up like telescopes. This time she found a little bottle on it ("which certainly was not here before," said Alice), and tied round the neck of the bottle was a paper label, with the words **DRINK ME** beautifully printed on it in large letters.

It was all very well to say "Drink me," but the wise little Alice was not going to do that in a hurry. "No, I'll look first," she said, "and see whether it's marked '*poison*' or not"; for she had read several nice little stories about children who had got burnt, and eaten up by wild beasts and other unpleasant things, all because they *would* not remember the simple rules their friends had taught them; such as, that a red-hot poker will burn you if you hold it too long; and that, if you cut your finger *very* deeply with a knife, it usually bleeds; and she had never forgotten that, if you drink much from a bottle marked "*poison*," it is almost certain to disagree with you sooner or later.

However, this bottle was *not* marked "*poison*," so Alice ventured to taste it and, finding it very nice (it had, in fact, a sort of

mixed flavor of cherry-tart, custard, pineapple, roast turkey, toffy, and hot buttered toast), she very soon finished it off.

"What a curious feeling!" said Alice. "I must be shutting up like a telescope."

And so it was, indeed; she was now only ten inches high, and her face brightened up at the thought that she was now the right size for going through the little door into that lovely garden. . . . But, alas for poor Alice, when she got to the door she found she had forgotten the little golden key, and when she went back to the table for it she found she could not possibly reach it.



"Curiouser and curiouser!" cried Alice. "Now I'm opening out like the largest telescope that ever was. Good-bye, feet! Oh, my poor feet!"

She could see it quite plainly through the glass, and she tried her best to climb up one of the legs of the table, but it was too slippery; and when she had tired herself out with trying, the poor little thing sat down and cried. . . .

Soon her eye fell on a little glass box that was lying under the table. She opened it, and found in it a very small cake, on which the words EAT ME were beautifully marked in currants.

"Well, I'll eat it," said Alice, "and if it makes me grow larger, I can reach the key; and if it makes me grow smaller, I can creep under the door; so either way I'll get into the garden, and I don't care which happens."

She ate a little bit, and said anxiously to herself: "Which way? Which way?" holding her hand on the top of her head to feel which way it was growing, and she was quite surprised to find that she remained the same size; to be sure, this is what generally happens when one eats cake, but Alice had got so much into the way of expecting nothing but out-of-the-way things to happen that it seemed quite dull and stupid for life to go on in the common way.

So she set to work, and very soon finished off the cake.

"Curiouser and curiouser!" cried Alice (she was so much surprised that for the moment she quite forgot how to speak good English). "Now I'm opening out like the largest telescope that ever was. Good-bye, feet!" (for when she looked down at her feet they seemed to be almost out of sight, they were getting so far off). "Oh, my poor little feet! I wonder who will put on your shoes and stockings for you now, dears? I'm sure *I* shan't be able. I shall be a great deal too far off to trouble myself about you; you must manage the best way you can. But I must be kind to them," thought Alice, "or perhaps they won't walk the way I want to go. Let me see; I'll give them a new pair of boots every Christmas."

Just at this moment her head struck against the roof of the hall; in fact, she was now more than nine feet high, and she at once took up the little golden key and hurried off to the garden door.

Poor Alice! It was as much as she could do, lying down on one side, to look through into the garden with one eye, but to get through was more hope-

less than ever. She sat down and began to cry again.

"You ought to be ashamed of yourself," said Alice, "a great girl like you" (she might well say this), "to go on crying in this way! Stop this moment, I tell you!"

But she went on all the same, shedding gallons of tears, until there was a large pool all around her, about four inches deep and reaching half down the hall.

After a time she heard a little pattering of feet in the distance, and she hastily dried her eyes to see what was coming. It was the White Rabbit returning splendidly dressed, with a pair of white kid gloves in one hand and a large fan in the other. He came trotting along in a great hurry, muttering to himself as he came: "Oh, the Duchess! the Duchess! Oh, won't she be savage if I've kept her waiting!"

Alice felt so desperate that she was ready to ask help of anyone; so, when the Rabbit came near her, she began, in a low, timid voice:

"If you please, sir—"

The Rabbit started violently, dropped the white kid gloves and the fan, and skurried away into the darkness as hard as he could go.

Alice took up the fan and gloves, and, as the hall was very hot, she kept fanning herself all the time she went on talking:

"Dear, dear! How queer everything is to-day! And yesterday things went on just as usual. I wonder if I've been changed in the night? Let me think: was I the same when I got up this morning? I almost think I can remember feeling a little different. But if I'm not the same, the next question is: Who in the world am I? Ah, *that's* the great puzzle!"

And she began thinking over all the children she knew that were of the same age as herself, to see if she could have been changed for any of them.

"I'm sure I'm not Ada," she said, "for her hair goes in such long ringlets, and mine doesn't go in ringlets at all; and I'm sure I can't be Mabel, for I know all sorts of things, and she, oh, she knows such a very little! Besides, *she's* she, and *I'm* I, and—oh dear, how puzzling it all is! I'll try if I know all the things I used to know. Let me see: four times five is twelve, and four times six is thirteen, and four times seven

is—oh dear, I shall never get to twenty at that rate! However, the multiplication table don't signify; let's try geography. London is the capital of Paris, and Paris is the capital of Rome, and Rome—no, *that's* all wrong, I'm certain. I must have been changed for Mabel. I'll try and say 'How doth the little—?' And she crossed her hands on her lap as if she were saying lessons, and began to repeat it, but her voice sounded hoarse and strange, and the words did not come the same as they used to do:

"How doth the little crocodile
Improve his shining tail,
And pour the waters of the Nile
On every golden scale!

"How cheerfully he seems to grin,
How neatly spreads his claws,
And welcomes little fishes in
With gently smiling jaws!"

Alice was quite certain these were not the right words, and she rather fancied now that she must be Mabel, after all. But presently, on looking down at her hands, she was surprised to see that she had put on one of the Rabbit's little white kid gloves while she was talking.

"How *can* I have done that?" she thought. "I must be growing small again."

She got up, and went to the table to measure herself by it, and found that, as nearly as she could guess, she was now about two feet high, and was going on shrinking rapidly. She soon found out that the cause

of this was the fan she was holding, and she dropped it hastily, just in time to save herself from shrinking away altogether.

"That *was* a narrow escape," said Alice, a good deal frightened at the

sudden change, but very glad to find herself still in existence; "and now for the garden." And she ran with all speed back to the little door; but, alas! the little door was shut again, and the little golden key was lying on the glass table as before, "and things are worse than ever," thought the poor child, "for I never was so small as this before, never! And I declare it's too bad, that it is!"

As she said these words her foot slipped, and in another moment, splash! she was up to her chin in salt water. Her first idea was that she had somehow fallen into the sea, "and in that case I can go back by railway," she said to herself. . . . However, she soon made out that she was in the pool of tears which she had wept when she was nine feet high.

"I wish I hadn't cried so much," said Alice, as she swam about, trying to find her way out. "I shall be punished for it now, I suppose, by being drowned

in my own tears. That *will* be a queer thing, to be sure. However, everything is queer to-day."

Just then she heard something splashing about in the pool a little way off, and she swam nearer to make out what it was. At first she thought it must be a walrus or hippopotamus, but then she remembered how small she was now, and she soon made out that it was only a mouse that had slipped in like herself.

"Would it be of any use, now," thought Alice, "to speak to this mouse? Everything is so out-of-the-way down here that I should think very likely it can talk; at any rate, there's no harm in trying." So she began: "O Mouse, do you know the



It was the White Rabbit, splendidly dressed. He trotted along, muttering to himself: "Oh, the Duchess! the Duchess! Oh, won't she be savage if I've kept her waiting!"

way out of this pool? I am very tired of swimming about here, O Mouse." (Alice thought this must be the right way of speaking to a mouse; she had never done such a thing before, but she remembered having seen in her brother's Latin Grammar, "A Mouse—of a mouse—to a mouse—a mouse—O mouse.") The Mouse looked at her rather inquisitively, and seemed to her to wink with one of its little eyes, but it said nothing.

"Perhaps it doesn't understand English," thought Alice; "I dare say it's a French mouse come over with William the Conqueror." So she began again: "Où est ma chatte?" which was the first sentence in her French lesson book. The Mouse gave a sudden leap out of the water, and seemed to quiver all over with fright. "Oh, I beg your pardon!" cried Alice hastily, afraid that she had hurt the poor animal's feelings. "I quite forgot you don't like cats."

"Not like cats!" cried the Mouse, in a shrill, passionate voice. "Would you like cats if you were me?"

"Well, perhaps not," said Alice, in a soothing tone; "don't be angry about it. And yet I wish I could show you our cat Dinah; I think you'd take a fancy to cats if you could only see her. She is such a dear quiet thing," Alice went on, half to herself, as she swam lazily about in the pool, "and she sits purring so nicely by the fire, licking her paws and washing her face; and she is such a nice soft thing to nurse, and she's such a capital one for catching mice— Oh, I beg your pardon!" cried Alice again, for this time the Mouse was bristling all over, and she felt certain it must be really offended. "We won't talk about her any more if you'd rather not."

"We indeed!" cried the Mouse, who was trembling down to the end of its tail. "As if I would talk on such a subject! Our family always hated cats—nasty, low, vulgar things! Don't let me hear the name again!"

"I won't, indeed!" said Alice, in a great hurry to change the subject of conversation.

"Are you—are you fond—of—of dogs?" The Mouse did not answer, so Alice went on eagerly: "There is such a nice little dog near our house I should like to show you. A little bright-eyed

terrier, you know, with oh, such long curly brown hair! And it'll fetch things when you throw them and it'll sit up and beg for its dinner, and all sorts of things. I can't remember half of them—and it belongs to a farmer, you know and he says it's so useful, it's worth a hundred pounds! He says it kills all the rats and— Oh dear!" cried Alice in a sorrowful tone. "I'm afraid I've offended it again." For the Mouse was swimming away from her as hard as it could go, and making quite a commotion in the pool as it went.

So she called softly after it:

"Mouse, dear! Do come back again, and we won't talk about cats or dogs either, if you don't like them!" When the Mouse heard this, it turned round and swam slowly back to her; its face was quite pale (with passion, Alice thought), and it said in a low, trembling voice: "Let us get to the shore, and then I'll tell you my history, and you'll understand why it is I hate cats and dogs."

It was high time to go, for the pool was getting quite crowded with the birds and animals that had fallen into it; there were a duck and a dodo, a lory and an eaglet, and several other curious creatures. Alice led the way, and the whole party swam to the shore.

A very queer-looking party of dripping birds and animals now gathered on the bank of the Pool of Tears; but they were not so queer as their talk. First the Mouse, who was quite a person of authority among them, tried to dry them by telling them frightfully dry stories from history. But Alice said she was as wet as ever after she had listened to the bits of English history; so the Dodo proposed a Caucus race. They all started off when they liked, and stopped when they liked. The Dodo said everybody had won, and Alice had to give the prizes. Luckily she had some sweets, which were not wet, and there was just one for each of them, but none for herself. The party were anxious she, too, should have a prize, and as she happened to have a thimble, the Dodo commanded her to hand it to him, and then, with great ceremony, the Dodo presented it to her, saying: "We beg your acceptance of this elegant thimble," and they all cheered. Of course, Alice

thought this all very absurd; but they were dry now, and began eating their sweets. Then the Mouse began to tell Alice its history, and to explain why it hated C and D—for it was afraid to say cats and dogs. But she soon offended the Mouse, first by mistaking its "long and sad tale" for a "long tail," and next by thinking it meant "knot" when it said "not," so that it went off in a huff. Then when she mentioned Dinah to the others, and told them that was the name of her cat, the birds got uneasy, and one by one the whole party gradually went off and left her all alone. Just when she was beginning to cry, she heard a pattering of little feet, and half thought it might

Run home this moment, and fetch me a pair of gloves and a fan. Quick, now!" And Alice was so much frightened that she ran off at once in the direction he pointed to, without trying to explain the mistake that he had made.

"He took me for his housemaid," she said to herself as she ran. "How surprised he'll be when he finds out who I am! But I'd better take him his fan and gloves—that is, if I can find them." As she said this, she came upon a neat little house, on the door of which was a bright brass plate with the name W. RABBIT engraved upon it. She went in without knocking, and hurried upstairs, in great fear lest she



"Would it be of any use, now," thought Alice, "to speak to this mouse? Everything is so out-of-the-way down here that I should think very likely it can talk; at any rate, there's no harm in trying." So she began: "O Mouse, do you know the way out of this pool? I am very tired of swimming about, O Mouse."

be the Mouse coming back to finish its story.

It was the White Rabbit, trotting slowly back again, and looking anxiously about as he went, as if he had lost something; and she heard him muttering to himself: "The Duchess! The Duchess! Oh, my dear paws! Oh, my fur and whiskers! She'll get me executed, as sure as ferrets are ferrets! Where *can* I have dropped them, I wonder?" Alice guessed in a moment that he was looking for the fan and the pair of white kid gloves, and she very good-naturedly began hunting about for them, but they were nowhere to be seen—everything seemed to have changed since her swim in the pool, and the great hall, with the glass table and the little door, had vanished completely.

Very soon the Rabbit noticed Alice, as she went hunting about, and called out to her in an angry tone: "Why, Mary Ann, what *are* you doing out here?

should meet the real Mary Ann and be turned out of the house before she had been able to find the fan and gloves.

"How queer it seems," Alice said to herself, "to be going messages for a rabbit! I suppose Dinah'll be sending me on messages next."

By this time she had found her way into a tidy little room with a table in the window, and on it—as she had hoped—a fan and two or three pairs of tiny white kid gloves. She took up the fan and a pair of the gloves, and was just going to leave the room when her eye fell upon a little bottle that stood near the looking-glass. There was no label this time with the words DRINK ME, but, nevertheless, she uncorked it and put it to her lips.

"I know *something* interesting is sure to happen," she said to herself, "when-
ever I eat or drink anything; so I'll just see what this bottle does. I do

hope it'll make me grow large again, for really I'm quite tired of being such a tiny little thing."

It did so, indeed, and much sooner than she had expected; before she had drunk half the bottle, she found her head pressing against the ceiling, and had to stoop to save her neck from being broken. . . . She went on growing and growing, and very soon had to kneel down on the floor; in another minute there was not even room for this, and she tried the effect of lying down with one elbow against the door, and the other arm curled round her head.

Still she went on growing, and, as a last resource, she put one arm out of the window, and one foot up the chimney, and said to herself:

"Now I can do no more, whatever happens. What *will* become of me?"

Luckily for Alice, the little magic bottle had now had its full effect, and she grew no larger; still, it was very uncomfortable, and, as there seemed to be no sort of chance of her ever getting out of the room again, no wonder she felt unhappy.

"It was much pleasanter at home," thought poor Alice, "when one wasn't always growing larger and smaller, and being ordered about by mice and rabbits. I almost wish I hadn't gone down that rabbit-hole; and yet—and yet—it's rather curious, you know, this sort of life. I do wonder what *can* have happened to me! When I used to read fairy tales, I fancied that kind of thing never happened, and now here I am in the middle of one." . . .

After a few minutes she heard a voice outside, and stopped to listen.

"Mary Ann! Mary Ann!" said the voice. "Fetch me my gloves this moment!" Then came a little pattering of feet on the stairs. Alice knew it was the Rabbit coming to look for her, and she trembled till she shook the house, quite forgetting that she was now about a thousand times as large as the Rabbit, and had no reason to be afraid of him.

Presently the Rabbit came up to the door, and tried to open it; but, as the door opened inwards, and Alice's elbow was pressed hard against it, that attempt proved a failure. Alice heard him say to himself: "Then I'll go round and get in at the window."

"*That* you won't," thought Alice, and, after waiting till she fancied she heard the Rabbit just under the window, she suddenly spread out her hand, and made a snatch in the air. She did not get hold of anything, but she heard a little shriek and a fall, and a crash of broken glass, from which she concluded that it was just possible he had fallen into a cucumber-frame, or something of the sort.

Next came an angry voice, the Rabbit's:

"Pat! Pat! Where are you?" And then a voice she had never heard before: "Sure then, I'm here. Digging for apples, yer honor."

"Digging for apples, indeed!" said the Rabbit angrily. "Here! Come and help me out of *this*!" (Sounds of more broken glass.)

"Now tell me, Pat, what's that in the window?"

"Sure, it's an arm, yer honor." (He pronounced it "arrum.")

"An arm, you goose! Who ever saw one that size? Why, it fills the whole window!"

"Sure, it does, yer honor; but it's an arm for all that."

"Well, it's got no business there, at any rate; go and take it away."

There was a long silence after this, and Alice could only hear whispers now and then, such as: "Sure, I don't like it, yer honor, at all—at all." "Do as I tell you, you coward!"

And at last she spread out her hand again, and made another snatch in the air.

This time there were *two* little shrieks, and more sounds of broken glass.

"What a number of cucumber-frames there must be!" thought Alice. "I wonder what they'll do next? As for pulling me out of the window, I only wish they *could*. I'm sure I don't want to stay in here any longer."

She waited for some time without hearing anything more. At last came a rumbling of little cart-wheels, and the sound of a good many voices all talking together; she made out the words: "Where's the other ladder? Why, I hadn't to bring but one; Bill's got the other. Bill, fetch it here, lad. Here, put 'em up at this corner. No, tie 'em together first, they don't reach half high enough yet. Oh, they'll do well enough;

ALICE AT THE STORY-TELLING PARTY



It was a queer-looking party of dripping birds and animals that gathered around Alice on the edge of the Pool of Tears. The Mouse tried to dry them by telling very dry stories from history, and Alice broke the party up at last by thoughtlessly speaking of her cat Dinah. The animals simply couldn't bear to hear of Dinah or any other cat. One by one the whole party went off and left her all alone.

don't be particular! Here, Bill, catch hold of this rope! Will the roof bear? Mind that loose slate! Oh, it's coming down! Heads, below!" (a loud crash). "Now, who did that? It was Bill, I fancy. Who's to go down the chimney? Nay, I shan't. *You* do it! *That* I won't, then! Bill's got to go down. Here, Bill, the master says you've got to go down the chimney!"

"Oh! So Bill's got to come down the chimney, has he?" said Alice to herself. "Why, they seem to put everything upon Bill. I wouldn't be in Bill's place for a good deal; this fireplace is narrow, to be sure; but I *think* I can kick a little."

She drew her foot as far down the chimney as she could, and waited till she heard a little animal (she couldn't guess of what sort it was) scratching and scrambling about in the chimney close above her; then, saying to herself, "This is Bill," she gave one sharp kick, and waited to see what would happen next.

The first thing she heard was a general chorus of "There goes Bill!" then the Rabbit's voice alone: "Catch him, you by the hedge!" Then silence, and then another confusion of voices: "Hold up his head. Brandy now. Don't choke him. How was it, old fellow? What happened to you? Tell us all about it."

Last came a little feeble squeaking voice. ("That's Bill," thought Alice.) "Well, I hardly know. No more, thank'ye; I'm better now, but I'm a deal too flustered to tell you. All I know is, something comes at me like a Jack-in-the-box, and up I goes like a sky-rocket."

"So you did, old fellow," said the voices of the others, speaking in chorus.

"We must burn the house down," said the Rabbit's voice.

And Alice called out as loud as she could: "If you do, I'll set Dinah at you."

There was dead silence instantly, and Alice thought to herself: "I wonder what they *will* do next? If they had any sense, they'd take the roof off." After a minute or two, they began moving about again, and Alice heard the Rabbit say: "A barrowful will do to begin with."

"A barrowful of *what*?" thought Alice. But she had not long to doubt, for the next moment a shower of little pebbles came rattling in at the window, and some of them hit her in the face. "I'll put a stop to this," she said to herself, and shouted out: "You'd better not do that again!" which produced another dead silence.

Alice noticed, with some surprise, that the pebbles were all turning into little cakes as they lay on the floor, and a bright idea came into her head.

"If I eat one of these cakes," she thought, "it's sure to make some change in my size; and, as it can't possibly make me larger, it must make me smaller, I suppose."

So she at once swallowed one of the cakes, and to her great delight she found that she immediately began to shrink. As soon as she had shrunk small enough to get through the door, she ran quickly out of the house, and found quite a crowd of little animals and birds waiting outside. The poor little Lizard, Bill, was in the middle of the crowd, being held up by two guinea-pigs, who were giving him something out of a



Alice in the rabbit's house.

bottle. They all made a rush at Alice the moment she appeared; but she ran off as hard as she could, and soon found herself safe in a thick wood. The story of what happened and what the Blue Caterpillar said is told on page 1179.

THE HUSBAND WHO WAS TO MIND THE HOUSE

BY KAY NEILSEN

ONCE on a time there was a man, so surly and cross, he never thought his wife did anything right in the house. So, one evening, in hay-making time, he came home, scolding and swearing, and showing his teeth and making a dust.

"Dear love, don't be so angry; there's a good man," said his goody; "to-morrow let's change our work. I'll go out with the mowers and mow, and you shall mind the house at home."

Yes! the husband thought that would do very well. He was quite willing, he said.

So, early next morning, his goody took a scythe over her neck, and went out into the hayfield with the mowers, and began to mow; but the man was to mind the house, and do the work at home.

First of all, he wanted to churn the butter; but when he had churned a while, he got thirsty, and went down to the cellar to tap a barrel of ale. So, just when he had knocked in the bung, and was putting the tap into the cask, he heard overhead the pig come into the kitchen. Then off he ran up the cellar steps, with the tap in his hand, as fast as he could, to look after the pig, lest it should upset the churn; but when he got up, and saw the pig had already knocked the churn over, and stood there, routing and grunting among the cream which was running all over the floor, he got so wild with rage that he quite forgot the ale-barrel, and ran at the pig as hard as he could. He caught it, too, just as it ran out of doors, and gave it such a kick, that piggy lay for dead on the spot. Then all at once he remembered he had the tap in his hand; but when he got down to the cellar, every drop of ale had run out of the cask.

Then he went into the dairy and found enough cream left to fill the churn again, and so he began to churn, for butter they must have at dinner. When he had churned a bit, he remembered that their milking cow was still shut up in the byre, and hadn't had a bit to eat or a drop to drink all the morning, though the sun was high. Then all at once he thought 'twas too far to take her down to the meadow, so he'd just get her up on the house-top—for the house, you must know, was

thatched with sods, and a fine crop of grass was growing there. Now the house lay close up against a steep down, and he thought if he laid a plank across to the thatch at the back he'd easily get the cow up.

But still he couldn't leave the churn, for there was his little babe crawling about on the floor, and "if I leave it," he thought, "the child is safe to upset it." So he took the churn on his back, and went out with it; but then he thought he'd better first water the cow before he turned her out on the thatch; so he took up a bucket to draw water out of the well; but, as he stooped down at the well's brink, all the cream ran out of the churn over his shoulders, and so down into the well.

Now it was near dinner-time, and he hadn't even got the butter yet; so he thought he'd best boil the porridge, and filled the pot with water and hung it over the fire. When he had done that, he thought the cow might perhaps fall off the thatch and break her legs or her neck. So he got up on the house to tie her up. One end of the rope he made fast to the cow's neck and the other he slipped down the chimney and tied round his own thigh; and he had to make haste, for the water now began to boil in the pot, and he had still to grind the oatmeal.

So he began to grind away; but while he was hard at it, down fell the cow off the house-top after all, and as she fell, she dragged the man up the chimney by the rope. There he stuck fast; and as for the cow, she hung half-way down the wall, swinging between heaven and earth for she could neither get down nor up.

And now the goody had waited seven lengths and seven breadths for her husband to come and call them home to dinner; but never a call they had. At last she thought she'd waited long enough, and went home. But when she got there and saw the cow hanging in such an ugly place, she ran up and cut the rope in two with her scythe. But, as she did this, down came her husband out of the chimney; and so, when his old dame came inside the kitchen, there she found him standing on his head in the porridge pot.

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THE QUEST OF THE GOLDEN FLEECE

ONE day, long, long ago, a centaur sat on the bank of a river beside a stalwart youth, who leaned against the trunk of a shady tree. The centaur said:

"You are now twenty years old, and the time has come for you to reclaim the kingdom your step-uncle Pelias stole from your father."

"Oh, master Chiron," the young man replied, "I thank you for all that you have done for me. When I was a child you saved me from death by hiding me from my cruel uncle. Now I am a man, and I will do even as you bid me."

As he spoke Chiron ran his eye proudly over the slim, steel-corded limbs of his pupil.

"You will succeed," he said to Jason. "Go, and may the gods go with you!"

Clad in a leopard's skin, with sandals tied with golden strings, and in each hand a spear, Jason set out.

Coming to the river Enipeus, he found the stream swollen from recent rains. There was no ferry, and Jason sat on the shore to think of some means of getting across. Suddenly there appeared before him the goddess Hera in the form of an old woman.

"I will take you across," croaked she. "Get on my back."

Gladly Jason obeyed, and reached the opposite shore quite safely, except for the loss of one of his sandals. From the river's bank he hurried on to the town of Iolcus by the sea. The people in the streets, when they saw that he had lost one of his sandals, cried, "Look! Look!

He wears but one sandal! He has come at last. What will the King say?" For, long before, it had been foretold that a stranger wearing one sandal only would come to Iolcus and would take the kingdom away from Pelias. When the King saw Jason he was much frightened. Then he thought he would entrap Jason by a question. "What would you do," he asked, "with a man by whom you were doomed to be ruined?" Jason thought. "I would send him for the Golden Fleece," he said at last. The Golden Fleece was the skin of a magical ram that had saved two children from death. It was hung upon a tree in a sacred grove in a land far away over the sea, protected by a fearful dragon. To secure the Golden Fleece would be the most difficult and dangerous task in the world.

Pelias was delighted at the suggestion, for he thought that Jason would be killed. So he said, "You are the man. Go and bring back the Golden Fleece to me, and then I will give you my throne."

Again Jason thought. "I will go," he said fearlessly. "And when I come back you shall give me your crown."

Young Jason then went to a wonderful tree known as the Talking Oak.

"What shall I do that I may find the Golden Fleece?" he asked the oak.

"Go to Argus," said the tree, "and ask him to build a galley with fifty oars, needing fifty strong men to row it."

With the help of the goddesses Athene and Hera, Jason and Argus built a ship which they called the Argo, and in-

vited fifty of the foremost heroes of Greece to join the adventure. When all was ready they set sail, and at length, after many adventures, the Argo came to Colchis, where the dragon guarded the Golden Fleece. Jason at once went to Aeetes, the king of Colchis, and told him of his errand. The king was very angry, but he disguised his anger and answered cunningly:

"Stranger, before allowing you to take the Golden Fleece, you will understand that I must first test your valor and your powers. You will find two brazen-footed bulls of mine in that pasture in the War God's plain. The breath that comes from their mouths is flames of fire. If you will yoke these bulls and with them plow the field of Ares, and then sow the plain with dragon's teeth, then will I let you have the Golden Fleece."

It seemed an impossible task. Jason was convinced that he could not do it without some magic assistance—and where in this strange land was he to get such help? But, unnoticed by him, while he had been in the king's reception hall, a beautiful dark-haired girl had observed him closely. Shewas Medea, the daughter of King Aeetes, who at first sight loved the sun-browned, god-like stranger, and made up her mind to save him by her magic power.

While Jason was considering what he would do, Princess Medea came up to him and gave him a box of ointment. "Take this," she said, "and rub it on your body and your shield. It will protect you from the fiery breath of the bulls, and give you strength to overcome and tame them. Then when you have plowed the field and sowed the dragon's teeth, throw a great stone among the warriors that will spring up from the ground. This will make them turn and fight one another instead of killing you."

The next day Jason, with all the court of King Aeetes looking on, went into the plains to harness the fiery bulls. All happened just as Princess Medea had said. Jason overcame the bulls because of the great strength given him by the magic ointment, and was unharmed by the tongues of flame. But when the army of warriors sprang up from the dragon's teeth, it seemed to all the onlookers as if the young man would certainly be

killed, for they all rushed upon him with drawn swords, shouting fiercely, "Guard the Golden Fleece." Remembering the words of the Princess, Jason threw a great stone among the onrushing soldiers, and immediately they all turned one upon another. Jason himself joined in the fray, and when at last the battle was over, he was the only man of all the fighters who was left alive.

The people marveled, and King Aeetes was so furious that he firmly made up his mind to kill Jason and all the heroes who had come to Colchis in the Argo. But the Princess Medea heard of her father's plan, and sent word to Jason, saying, "Meet me at midnight to-night and I will show you the way to the sacred grove where hangs the Golden Fleece." Accordingly, in the stillness of the night Jason met her, and together they sought the glory of the Golden Fleece. About the foot of the tree a fearful dragon lay coiled, its great neck swaying back and forth. Suddenly Princess Medea opened her lips and began to sing. With her eyes fixed upon the serpent, she slowly advanced singing—singing—all the while. In her hand she bore a spray of juniper dipped in one of her magic brews, and as the fumes reached the serpent's nostrils, its eyes began to blink and gradually closed. Presently the dragon-jaws closed, and the fearful creature lay asleep.

"Hurry, hurry!" Medea whispered to Jason. "Snatch the Golden Fleece and escape, for the dragon will soon awake." Fearlessly she smeared the head of the monster with her sleeping potion while Jason seized the Golden Fleece. Just in time they fled together from the grove. With a horrible roar the dragon awoke, and seeing its treasure gone, pursued the two with fearful bellowing. As they reached the shore, the dragon was upon them. But the Argo was ready. With one wild leap they were on board, and the rowers quickly plied their oars and rowed away. As they drew from the land, the monster howled and spit fire from the bank, but it was of no avail. As the bright dawn streaked the east, the Argo set sail for Iolcus, bearing its treasure on board. Jason had won the Golden Fleece. With him went Medea, daughter of the king of Colchis, who became his wife. To her Jason owed the devices which had won the Fleece.

THE FABLES OF ÆSOP THE SLAVE

MERCURY AND THE WOODMAN

IN the olden days, when people believed in a great many different gods, a man was cutting down a tree beside a river when by accident the ax slipped out of his hand, fell into the water and at once sank to the bottom. As the man was very poor and could not afford to buy another ax, he sat down and grieved bitterly over his loss.

Suddenly the god Mercury appeared to him and asked him what was the matter. When the poor man told him, he at once dived to the bottom of the river, and when he came up again, held out a golden ax and asked the man if that was the one he had lost. The honest woodman said it was not. Then Mercury dived a second time, and brought up a silver ax. This, too, the woodman refused, saying that it did not belong to him.

The third time Mercury dived he brought up the iron ax that the woodman had lost. Its owner was delighted to see it, and thanked Mercury very warmly for restoring it to him. The god was so pleased with the man's honesty in refusing the gold and silver axes that he gave both of them to him as a reward.

When the woodman told the story to his companions, one of them went off to the river's bank, and purposely dropped his ax into the water. Then he sat down on the bank and pretended to cry and lament over his loss.

The god Mercury came as before, and diving into the river, brought up a golden ax and asked if that was the one the man had lost. He greedily snatched at it and said that it was, upon which Mercury threw it back into the river and would not even restore the ax that the man had dropped.

Honesty is the best policy.

THE WOLF AND THE KID

AMOTHER goat, who was going out in search of food, shut up her young kid at home and warned him not to open the door to anyone till she came back.

A wolf, who was hiding behind a bush close by, heard what she said, and as soon as she had gone he came and knocked at the door, and then, imitating the voice of the goat, called to the kid to open the door. But the kid was looking through the keyhole and could see that

it was not his mother; so he called out to the wolf to go away, saying that, however he might imitate the goat's voice, he looked far too much like a wolf to be trusted.

Never trust people who pretend to be different from what they really are.

THE FARMER AND THE STORK

AFARMER set a net in his fields one day to catch the cranes and geese which came to eat the newly sown corn. Several of these birds were caught in the net, and among them was a stork who pleaded very hard for his life, telling the farmer that he was not a goose or a crane, but a poor, harmless stork; that he did not come to steal the corn, but merely came in company with the other birds.

"All this may be very true," replied the farmer, "but as I have caught you with the thieves, you must suffer."

If we keep company with bad people, we must expect to suffer the consequences.

STAG LOOKING INTO THE WATER

A STAG, drinking by the side of a pond, saw himself reflected in the water as in a looking-glass. He stood admiring himself, and said: "Oh, what a beautiful pair of horns I have! How gracefully they hang over my forehead, and how nice they make my face look! I wish the rest of my body were as handsome; but I have such long, thin legs that I am ashamed of anyone seeing them."

Just then came the noise of some huntsmen and a pack of hounds. Away darted the stag in a fright, and bounding nimbly along on his slender legs, he soon left the men and dogs at a great distance behind him. Then he rushed into a wood to hide himself, but at the entrance his horns got entangled in some branches, and he was held fast till the hounds came and killed him.

As he was dying he said: "Oh, how unfortunate I am! I see now that the horns of which I was so proud are the cause of my death, while the long, thin legs that I thought so ugly are the only things that could have saved me."

Often the things we like most are not the best for us; while some things we dislike are useful and valuable.

THE NEXT STORIES ARE ON PAGE 1179.



A picture by Bernardino Luini, showing Jesus among the doctors, National Gallery, London.

VENICE RISES AND ITALY WANES

IT would seem that when Leonardo da Vinci, Michelangelo and Raphael had made their supreme gifts to the world's store of beauty, great Italy had done her share of giving and doing; she might well have folded her hands and rested. But one of the most amazing features in the history of painting in that glorious country is the rise of the school of Venice, the lovely, haunting city set like a jewel on an arm of the sea.

The early art of Venice centres round two men, one an artist and the father of artists, Jacopo Bellini, and the other a dealer in antiques, Squarcione. In Padua, neighbor to Venice, Squarcione had his shop, and round him gathered a group of artists. Squarcione may indeed be called the founder of the Paduan school, from which Venice gained her first lessons in painting.

Squarcione, a strange and eager man with an overwhelming love for beautiful things, had traveled much about Italy, and had also spent some time in Greece. In his wanderings he made a collection of works of art, among them some fragments of Greek sculpture which awakened intense interest among the Paduan group of students. One of these, Mantegna, Squarcione presently adopted as his son, and through this young and powerful

genius the Paduan school learned to love and follow Greek art. Through all the work of Mantegna we can see that he was seeking the classic ideal. His forms have the clear lines and the firmness of sculpture. His art is one of the loftiest, and perhaps the coldest, that Italy produced.

Donatello's bronzes made a strong impression upon Mantegna's art; and another influence was that of the Bellini family, into which he married. In 1459, at the age of twenty-eight, he went to Mantua to work under the patronage of the Gonzaga family, painting their portraits and decorating their palaces with scenes of court life. His greatest works are his admirable frescoes in Padua and Mantua. He left also a collection of pictures, drawings and engravings which are treasured in various galleries. In Mantegna's later work he allows his feeling for shape and line to override any sense of color he may have possessed, and produces a monochrome (one-color) effect.

Jacopo Bellini, of whose work little remains, is overshadowed by his sons, Giovanni and Gentile, who were the first great masters of Venice. But although through the Bellinis Paduan art became the inspiration of Venetian, another slight influence was at

work in the paintings of artists on the island of Murano.

The best men of this little colony were the Vivarini family. Alvise Vivarini worked as a pupil in the studio of his father Bartolommeo, and the style of the two men was very like in spirit to the Sienese. There is a picture by the elder Vivarini in the National Gallery, London; but his greatest work, and that of his son, is at Venice. A pupil of Alvise was Lorenzo Lotto, whose paintings show something of the Sienese spirit, and a peculiar gentle sadness which perhaps we may say was the outcome of his own temperament.

THE MAN WHO GAVE VENICE THE IDEA OF PAINTING IN OILS

During the time the Bellinis were working an artist called Antonello da Messina is said to have brought to Venice from Flanders, where he had been working, the method of painting in oil, an innovation of the highest importance to Venice. Antonello was a painter who, in an epoch less crowded with great men, would have gained far more distinction. His best work is portraiture. The finest examples are the *Condottiere*, in the Louvre, and *Portrait of a Man*, now in a private house in Milan. Another of his portraits—supposed to be of himself—is in the National Gallery, London, together with a picture which is his earliest signed work—*The Saviour*—a painting of the Crucifixion, and another of St. Jerome in his Study.

The Venetian artists, adopting oil as a medium, did not use it as we understand it now. They still painted in tempera, where the pigment coloring-matter is mixed with white of egg, and when the picture was fully worked out, and almost finished, they added the final coat in oil. This method, however, made a vast difference to the progress of painting in Venice, where damp and misty airs played havoc with exposed fresco and pure tempera.

THE MEN WHO GAVE VENICE ITS FINE PICTURES OF PAGEANTS

The careers of Gentile and Giovanni Bellini together cover the great years of Venetian painting. In the work of these two men, with Crivelli, another pupil of Alvise Vivarini, we see the growth of the peculiar qualities which were to mark Venetian art for another century and a half. For the first time in the history of Italian painting color was considered

as part of the making of a picture, and not added as an after-thought.

With the Bellini school began the pageant pictures so natural to a city where civic and religious processions of an amazing brilliance took place, when the doge and his followers showed themselves as a mass of bewilderingly beautiful color against the fair and lovely background of Venetian streets and waterways. This was the kind of picture the people of Venice hailed with great delight. They gloried in the pageantry of pictures like Gentile Bellini's *Corpus Christi*, or *Preaching of St. Mark*, or the *St. Ursula* pictures by Carpaccio, a pupil of Gentile.

The Bellinis and their friends were not concerned with the meaning of things—rather with their brightness and beauty. Some of their portraits are magnificent, such as that of the Doge Leonardo Loredano, by Giovanni, in the National Gallery, London. They painted religious subjects rather because they made great pictures than because they had a spiritual significance.

PICTURES THAT STIR THE HEART AFTER CENTURIES OF CHANGE

Only a few pictures by Gentile Bellini are left in the world, and the best of those are at Venice. His pageant pictures give an unusual effect of open air. An Oriental touch in some of his works is explained by his having gone to Constantinople in 1479, when the Sultan asked the Government of Venice to send their best painter.

It has been said that Giovanni Bellini was a whole school in himself. He went through many stages, absorbing and showing in his work the various changes through which Venetian art passed during his long lifetime and in different men's hands, from Mantegna to Titian. He painted chiefly religious subjects and allegories. His most notable weakness, perhaps, is that he could not express movement. The beauties of noble form, soft color and rich tone which we call truly Venetian are found first in his pictures. Giovanni's influence stirred all the neighborhood, rising in a crescendo of greatness to Titian, his immortal pupil. Many men owed their training and ideals to him, including Carpaccio and Cima da Conegliano. Carpaccio is remarkable as a great illustrator, a story-teller; and Cima as a painter of gentle, charming women represented as saints.

PICTURES FROM ITALY'S GREAT DAYS



Doge Giovanni Mocenigo, portrait by Gentile Bellini.



The Madonna of the Basket, by Correggio.



A portrait of himself, by Antonello da Messina.



The Three Sisters, by Palma Vecchio.



Ariosto, by Titian, in the National Gallery, London.



The Marriage of the two St. Catherine, by Borgognone.



Sultan Mohammed II, by Gentile Bellini.

Many of the paintings in these pages are from photographs by Messrs. Aunari, Anderson, Hanfstaengl and Bruckmann.

Other artists, followers of Giovanni Bellini, were Giorgione (1477-1510), Palma Vecchio (1480-1528) and Sebastiano del Piombo (1485-1547). The first of these is far the greatest, and had a considerable effect not only on the other two but on many other artists of the day. In Giorgione's work all the light and color and richness of the Venetian school ran riot. Giorgione had discovered the witchery of nature's loveliness. He was one of the first to give landscape a place of equal importance with the figures. He has nothing to do with the asceticism underlying the work of many other Italian schools of painting, nothing to do with the fine seriousness of his master Giovanni Bellini. He is completely satisfied with the beauty of life in Venice, drenched in color, haloed by the sun, girdled by the sea. The paintings of Titian and Giorgione stand out because of this quality. Even after the passage of five hundred years, during which time their color and radiance have suffered, these pictures stir our hearts.

THE MARVELOUS ART AND INDUSTRY OF THE GREAT TITIAN

Giorgione died in the early thirties, and there are only about fifteen pictures of his in existence now. The Piping Shepherd in Hampton Court, England, is a rare and lovely piece of work, as are the Fête Champêtre, in the Louvre, the Virgin and Child and Saints, in the Church of Castelfranco.

The Bellinis and their followers are sometimes spoken of as the youth of art in Venice, Titian as its vigorous young manhood, Giorgione as an exuberance natural to both, Tintoretto as Venetian art in its glorious prime.

Titian, or Tiziano Vecelli, who began as a pupil of Giovanni Bellini, would have soared to greatness in whatever country and generation he had been born. He lived from 1477 to 1576.

He could watch and admire the work of other geniuses and could imitate it, but in doing so he would make the quality he sought altogether his own. All through his long lifetime he was working, experimenting, trying this style and that subject, and was always supremely great. If it were not for his industry we might think that his greatness grew like the lilies, without taking thought. When we look at his work, we realize that almost every picture was a separate adventure

into which he flung the power and zest of his nature. He had nothing of the sorrowful gift of temperament, such as clouded Michelangelo's life with gray. He was a born pagan, and though he did much work of a religious character, he died a pagan, full of the happiness that the keen vision of beautiful things provokes.

THE MAN WHO COULD NOT HELP PAINTING LOVELY THINGS

By walking about for a few minutes in a gallery where the Italian schools are represented, we may be able to understand just what it is that makes the appeal of Titian—not the reason why artists worship the great Venetian, but the reason why he appeals to ourselves, those who are not artists.

We go first to the Sienese, and see what the first painters of Italy were about, see their bad drawing, their self-consciousness, the simple joy in painting which makes their wry-necked saints so interesting. Then we go to the Florentines, and see how carefully they were studying all the time—a little cold, utterly sure of their lines when once they had got them. If we are quite honest we may have to confess that we like many of these great men because we think we ought to, but when we get to the Venetian painters we are suddenly at home; we should like their pictures even if we were not taught that they were great; and Titian is the genius who in that way is at once our friend. He paints because he cannot help it, because the world is so full of beautiful things and he must set down what he sees.

Titian left a great pile of work for the joy of mankind, and it is now scattered in many different places. There are so many of his pictures in Madrid and Vienna that they in themselves give us a reason for wanting to visit those cities. Venice, of course, and Florence, are rich in treasures of Titian's work. Paris owns about a dozen, Dresden eight; in London there are nine or ten; and in collections in the United States the great Venetian is represented.

THE SPACIOUS AND INSPIRING PAINTINGS OF TINTORETTO

Tintoretto, called the Michelangelo of Venice, is not so near to everyday human taste as was Titian even in the gravity of his old age. Tintoretto sought huge and exacting problems in his work and seemed self-consciously to measure them with his

own strength. His aim was to combine in his own work the design of Michelangelo and the color of Titian. Many of his pictures are large piled-up compositions in which space, figure-drawing, color, and light and shade make difficulties which only a genius could overcome. Two such pictures are *The Massacre of the Innocents* and *The Presentation in the Temple*—both in Venice.

**THE TREMENDOUS WORK DONE
BY THESE OLD ARTISTS**

The color has faded in most of his larger pictures, and only in some of his portraits and small sketches do we get an idea of his palette. He turned away a little from the glowing warm color usual to Venetian painters, and worked in the silvery tones in which Titian himself, in his old age, was beginning to find pleasure.

As in the case of Titian, the number of paintings by Tintoretto in existence makes one wonder how these artists contrived to find time to eat and sleep. There are over a hundred of Tintoretto's paintings in Venice, twenty in Vienna, ten in Florence, and dozens scattered about in other towns of Europe. Others are in London and in the United States.

**THE VERONA SCHOOL OF ARTISTS
AND THEIR INFLUENCE**

Tintoretto shared with an artist from Verona, Paolo Veronese, the last honors of sixteenth-century art in Venice. Verona was a dependency of Venice, and for three or four generations artists had been working there, creating a small school of their own and affecting very much the art life of neighboring towns. Paolo Veronese, the pupil of Brusasorci, was the outcome of this movement. He saw subjects more as pictures and less as figure-studies than did most of the painters of his day. He had a freshness and a serenity of his own, and though classed with the Venetians and imbued with their love of light and brilliant costume, he retained, throughout, his own personality. The feeling of his work is largely decorative. Italy was now under the Spanish domination, and in Paolo Veronese's work is reflected a little of the Spanish ceremonial and style of dress.

He painted, among many other works, a series of banquet scenes for the walls of refectories in monasteries. The most celebrated is the *Marriage at Cana*—an immense picture including 130 figures.

Here the great period of Venetian

painting comes suddenly to an end. In the eighteenth century there was in Venice a strange and brief revival of Renaissance art, most beautifully born out of due time, in the work of Giovanni Battista Tiepolo, who really belongs to the sixteenth century. Venice was very little changed—still gay, pleasure-loving, rioting in color and sunlight; and this artist threw all her magic qualities into his pictures. A very fine specimen of his painting is the *Adoration of the Magi*, now at Munich. Two other artists who were working at about the same time were Guardi and Canaletto. They painted beautiful pictures of the city of the lagoons, full of light and space.

There were several minor schools in north Italy similar to those of Verona and Padua, and artists in these communities maintained a steady activity, even if they did not rise to great heights.

**THE GOOD PAINTERS WHOSE PICTURES
ARE PERHAPS TOO PRETTY**

The Milanese school as a whole erred on the side of prettiness. Ambrogio Borgognone (about 1455-1523) is not so much open to this charge as many other artists of Milan. He painted some very fine religious subjects and a number of low-toned, beautiful landscapes with figures. Two of his pictures are in the National Gallery, London, but his best work is to be seen in his frescoes and altarpieces in Italy.

The Milanese school seemed to suffer from Leonardo da Vinci's visit to the town, as the great master's work found many imitators who could not aspire to his greatness and only parodied his style. Bernardino Luini was perhaps the weakest of these followers. His pictures are too finished, too charming. Some frescoes which Luini painted in the church of Saronno showed that he was capable of good painting, but for the most part his productions were merely "pretty."

The school of Brescia produced, among many artists of only passable merit, two painters—Moretto and Moroni. Their work can be best studied in Brescia, but various other cities of Europe and America possess excellent examples of their painting. Moroni painted only portraits, and was a pupil of Moretto, who painted frescoes and large group pictures as well as portraits, and who was the strongest representative of the school.

Correggio, who lived from 1494 to 1534,

exercised on Italian art of his own and the next century an influence almost as powerful as that of Michelangelo. He had the great Florentine's passion for form without his solemnity and grandeur, and he had a fatal facility—a kind of easy knack—for showing movement and foreshortening in figures which was only just balanced by his genius. This is shown in the wonderful painting of the Assumption, in the dome of Parma Cathedral, and in the Virgin and Child with St. George, in the Dresden Gallery. The artist's greatest fault was that he overcrowded his spaces.

THE STRIKING OF THE DEATH-KNELL OF ITALIAN ART

Correggio was, above all, a painter of beautiful women. His Madonnas are very lovely, a little too lovely, perhaps. He is happiest in his pictures of the women of Classical story. He is especially noted for his able handling of light and shade, which was never more skillfully treated than in his Holy Night, in the Royal Museum, Dresden. In this picture the light shining upon the group seems to radiate from the Infant in the manger.

In the late sixteenth century and the early seventeenth, art in Italy centred in Bologna. There a number of painters, headed by members of the family of Carracci, formed a school whose principle was that each artist should imitate the best qualities of the greatest Italian artists. In painting, after a student has mastered drawing he has still other problems to deal with: color treatment, space composition and perspective. A true artist solves these problems for himself, instead of trying to use another man's methods to save himself trouble. Although some of the work of the Carracci themselves was notable, and showed an instinct for greatness, their followers struck the death-knell of Italian art.

THE EMOTIONS AND THOUGHTS THAT GREAT ART REPRODUCES

In their work, instead of strength, we get prettiness; instead of portraits which show in a face the soul of a man or woman, we get a pleasing expression, a passing feeling—a smile, a frown, happiness on the surface, pain of the passing moment. Great art does not aim at easy effect; it is impersonal, and reaches beyond the accident of the hour. It reproduces those feelings and thoughts which are like the

foundations of a person's character, and which in time can make a beautiful face repulsive and a plain face lovely.

If you see a portrait which reminds you of a photograph, as of a lady with a charming smile, and all the lines of age carefully touched out, be sure that portrait is poor art. Leonardo's famous Mona Lisa does not come under this ban, because in her subtle smile was expressed the woman's character, history and destiny. A face like Guido Reni's *Ecce Homo*, which appeals to a shallow emotion without appealing to reason and thought, is poor art.

The best men of the Carracci school of Bolognese art were Albano, Domenichino, Guido Reni and Guercino. In spite of their other weakness some of these artists were excellent decorators. Domenichino's Last Supper, and Guido Reni's *Aurora*, both in Rome, are sufficient proof of that.

HOW TO KNOW THE TRUE FROM THE FALSE IN ART

Presently an artist called Caravaggio came into prominence, and he turned his fellow-workers away from imitating and taught them a rather brutal realism. He went for most of his models to vulgar people and in his earlier pictures used genre subjects, such as card-players in an inn or gipsy fortune-tellers. Later he painted large religious groups, but the figures of the saints were sometimes coarse and unlovely. The really great one is a *Burial of Christ*, now in the Vatican.

An artist of Naples, Salvator Rosa, was a fine painter of landscape and war pictures, and he stands out as being stronger than the rest.

Unhappily, the artists of the decadent period in Italy produced an enormous number of pictures. They are seen in almost every gallery in Europe, and they have an easy triumph with people who have not had the advantage of learning to know the true from the false in art. This is not easy to know. The only way we can guard ourselves from false idols in the world of beauty is to have real acquaintance with the great. If we have once learned to love Michelangelo and Beethoven, we need not be afraid of liking the wrong kind of music and pictures; sooner or later the anchor will pull; Beethoven and Michelangelo, if we but trust them and listen to them, will set us right.

THE NEXT STORY OF THE FINE ARTS IS ON PAGE 1221.

PICTURES OF THE TIME OF TITIAN



Courtesy of the Metropolitan Museum of Art

THE PORTRAIT OF ALFONSO D'ESTE BY TITIAN IN THE METROPOLITAN MUSEUM, NEW YORK



THE EMPRESS ISABELLA, BY
TITIAN, IN THE PRADO, MADRID



A PORTRAIT, BY ANTONELLO DA
MESSINA, IN ANTWERP MUSEUM



THE MADONNA AND CHILD, BY
GIOVANNI BELLINI, VENICE



THE HOLY FAMILY WITH ST. PAUL AND ST. GEORGE, BY GIOVANNI BELLINI, THE ACADEMY, VENICE



AURORA, BY GUIDO RENI, IN THE VILLA ROSPIGLIOSI
AT ROME



THE MARRIAGE AT CANA, BY PAOLO VERONESE,
IN THE DRESDEN GALLERY



LA FORNARINA, BY PIOMBO,
UFFIZI GALLERY, FLORENCE



LAURA DE' POLA, BY LORENZO
LOTTO, AT THE BRERA, MILAN



FLORA, BY TITIAN, IN THE UFFIZI
GALLERY, FLORENCE



THE MADONNA AND ST. JEROME, BY CORREGGIO, IN THE PARMA GALLERY



THE HOLY FAMILY WITH ST. CATHERINE
BY TITIAN, NATIONAL GALLERY, LONDON



THE MEETING OF JACOB AND RACHEL,
BY PALMA VECCHIO AT DRESDEN



ST. GEORGE, BY MANTEGNA,
THE ACADEMY, VENICE



MAGDALEN, A PAINTING BY
PAOLO VERONESE



A NOBLEMAN, BY MORETTO,
NATIONAL GALLERY, LONDON



THE MADONNA OF THE CUCCINA FAMILY, BY PAOLO VERONESE, IN THE DRESDEN GALLERY



THE TRANSFIGURATION, BY GIOVANNI BELLINI,
IN THE NAPLES MUSEUM



THE MARRIAGE OF ST. CATHERINE,
BY TINTORETTO, AT VENICE



Archimedes tries to measure the area of a circle.

CAN WE SQUARE A CIRCLE?

SQUARING the circle is one of those curious and impossible tasks, like searching after the perpetual motion, which have occupied men's minds through the centuries and led to much waste of valuable time and energy.

The problem is to make a square exactly equal in area to a given circle. This may seem easy, and so it would be if we knew the area of the circle, for we should simply find the square root of the area and make a square with that as the length of its sides. For instance, suppose we had a circle with an area of 100 square inches. The square root of 100 is 10, and a square with sides of 10 inches, would have an area of exactly 100 square inches.

But if we do not know the area of a circle, how are we to find it? There is, of course, a formula which is good enough for all practical purposes. We multiply the radius of the circle by itself and then by 3.1416—or, to be more accurate, by 3.14159. That number is the ratio of the circumference of a circle to its diameter, and mathematicians call it by the Greek letter π , pronounced *pi*.

But that is what mathematicians call a surd—a number which cannot be expressed exactly by any figures. For all practical purposes it is near enough, when worked out to four or

five decimal places: 3.14159; but, after all, that is only approximately correct,

though the error may not exceed one part in thirteen millions. In 1705 a mathematician named Abraham Sharp worked it out to 172 decimal places, and in 1873 a man named Shanks worked it to 707 places, having twenty years before worked it out to 607 places. It will be seen, therefore, that it is impossible to find the true area of a circle, and we can never make a square with the same area. In other words, it is impossible to square the circle.

In ancient times the ratio of a circle's circumference to its diameter was only guessed at roughly. Archimedes, the mathematical genius of the ancient world, made the first really scientific attempt to find the relation between the circumference of a circle and its diameter. He drew polygons—or many-sided figures—inside and outside a circle, with all their sides touching the circumference, and reckoned the length of the circumference as being midway between the length of the sides of these two polygons. He came to the conclusion that this ratio was between 3.141 and 3.142, or between 3.14159 and 3.1416. Seeing that the ratio, as accepted to-day, is 3.14159, and remembering the very immature state of

arithmetic in his day, and the fact that our simple Arabic numerals were not in use, the sum worked out by Archimedes was a marvelous achievement.

**WHY DOES AN ONION
MAKE OUR EYES WATER?**

Our eyes are really watering all the time, that is to say, we are producing tears that pass over the eyeball and keep it clean. We blink to carry the tears that appear under the upper lid over the surface of the eye. These tears escape into the nose. We say that our eyes water when the tears form so quickly that they cannot escape quickly enough. Onions give off something to the air which excites the ends of the nerves of smell in the nose and also excites the ends of the nerves of touch in the eyeball and eyelids. A message is sent to the brain telling the tear-glands to make tears quickly; and we say that our eyes water. There is use in this, for the rapid flow of tears helps to protect the eyelids and the eyeball from the stuff the onions give off. People who, for some reason, cannot produce tears, suffer from such things as onions because their eyes smart so severely.

**WHAT IS THE LEGEND
ABOUT QUEEN DIDO?**

Dido, the legendary queen of Carthage, was said to be the daughter of the king of Tyre, a famous town of Phœnicia. When the old monarch died, her brother Pygmalion turned her out of the kingdom, and she wandered for years from land to land in search of a place to live. One day a storm drove her ship to Africa. The princess was enchanted and wished to remain there; but, robbed of her fortune by her brother, how could she pay for land? Here Dido showed her wit.

"Will you grant me as much ground as the hide of a bull can cover?" she said to the natives, who could not refuse so small a request.

When it was granted, Dido cut the hide into very narrow slips and inclosed enough land to serve for the building of a citadel. So she founded Byrsa, which was to become Carthage, the powerful and famous rival of Rome.

Although she was beautiful, kind and beloved by all, Dido stabbed herself on a funeral pile in front of her people. According to the Latin poets Virgil and Ovid, Dido wished to die for love of

Æneas, after his sudden departure from Byrsa, on his way from fallen Troy to Italy. She was afterward honored as a goddess by her people.

**WHAT WAS THE OLD GREEK STORY
OF THE FLOOD?**

In the old stories of the gods it is told that, after the evils, escaped from Pandora's box, had spread throughout the world, Jupiter came down to see for himself the things that humans did.

Disguised as a beggar, he came upon the fifty sons of King Lycaon, who tended their father's flocks under the trees of gay Arcadia. The father of gods and men approached, expecting to be invited to share their meal, but none moved toward him, though two set their dogs upon him. Then Jupiter, hoping to be invited to the feast, sought the palace, and besought the king to give him rest. But for him there was no feast spread.

In the morning the king invited his friends to see him kill the beggar at the gate, but at his approach the beggar raised himself on his couch. One look from Jupiter's eyes and the king, dropping his sword, fled with fearful groans: he was transformed into a wolf. A dark cloud came over the earth, and the rains descended, the oceans swelled, the rivers overflowed. Plants, trees, flocks, and men were drowned, and the tempest wrecked ships at sea.

But in Greece a just man and a good woman, Deucalion and Pyrrha, built a raft which, protected by the gods, led them by the waters up to Parnassus, the only mountain spared by the floods. When the little raft reached the peak all other earthly things had perished, but Jupiter stopped the rain, the sea retired, and Deucalion and Pyrrha returned to earth again.

But great was their unhappiness alone on a barren earth. "Who will take care of us now," they wailed, "helpless and old as we are?"

Out of the silence came a voice promising the old couple that the world would be repopled if they should walk on with their heads veiled, throwing their mother's bones backward over their shoulders.

"How can we profane the bones of our dead?" said Pyrrha, much surprised. But in the evening Deucalion, who had been thinking over the strange command, said, "Is not the earth the mother of us all, and are not the stones her bones?"

At that the old couple began picking up stones and throwing them backward as they walked. And at nightfall, when they looked back over the plain, the stones had grown into men and women, and the earth was peopled again.

**WHAT DID THE FLEUR-DE-LIS MEAN
IN THE HISTORY OF FRANCE?**

The fleur-de-lis, or lily flower, was the symbol of royalty in France. In the twelfth century it was adopted in France by King Louis VII, whose blue banner at the crusades bore golden fleurs-de-lis. But it was Louis VIII who first used it on a royal seal.

Later kings were so fond of the fleur-de-lis that it was used in profusion for the decoration of ornaments. Charles V, in the fourteenth century, limited the fleur-de-lis to three on French coins and heraldry. Great families related to the crown, and commoners to whom the king granted favors were entitled to add a fleur-de-lis to their coat-of-arms. Some privileged towns also enjoyed the honor.

With the Revolution in 1789 the fleur-de-lis, with all other emblems recalling monarchy, disappeared. Napoleon revived symbols again, and chose the bee as his own, instead of the beloved white flower. King Louis Philippe gave up emblems in 1830.

**WHO WAS PALLAS ATHENE AND WHAT
WAS ONE OF HER HOBBIES?**

Pallas Athene, the goddess of wisdom of the ancients, was the daughter of Jupiter. She sprang forth from his head full grown and completely armed.

This goddess was fond of building towns. One day she noticed at the foot of a steep hill a fishing village, a lovely place from which one could watch the land and sea a long way off. "Raise me a temple on the hill and I will be your protector forever," she said to the people, who set to work gladly, some digging foundations, some carrying stones, and some searching for the best marble in the neighboring lands. But one day the god of the sea called out: "As I alone upheld the ships which brought the marble to the city, no one but me shall name the city, or I shall unchain such tempests as will swallow up the earth!" But to Neptune the wise Pallas answered: "If the city is destroyed, it will be neither yours nor mine. Let us each offer a gift to the people, and they shall choose their own patron."

So it was agreed. Neptune proudly struck the sea with his trident and a horse capered out of the waves. It was so handsome a steed that at the sight men, women and children clapped their hands. Then Pallas touched a green blade, and lo! there grew an olive tree. At once all the people cried: "Blessed be the olive tree, father of the oil that shall feed the hungry and keep light for us in the winter evenings. More precious than the horse is the olive." Thus the new town belonged to Pallas Athene, and after her was called Athens.

**WHO ARE THE EURASIANS
AND WHERE DO THEY LIVE?**

Eurasia is the name given by some geographers to the continental mass of land which comprises Europe and Asia, between which there is no natural dividing line. A Eurasian, however, does not mean any dweller in Eurasia. The term was used first in India years ago to describe certain people who had a Portuguese father and a Hindu mother. Then it became more general, and was applied to the children of any European father and a Hindu mother. Eventually the name came to mean any person of mixed Asiatic and European blood.

In the course of time it became a term of reproach, and some years ago the Eurasians of India petitioned the Government to change the title to Anglo-Indian. This was agreed to, and on the Census papers of 1911 the term Eurasian did not appear, Anglo-Indian being substituted.

The change, however, has led to some confusion, for English officials and their families who have spent many years in India have always been known as Anglo-Indians. The matter is still further complicated by the fact that the Eurasian community has been joined by many full-blooded Hindus, who have no European blood at all in their veins, but have taken English names, adopted Christianity, and call themselves Anglo-Indians.

**WHY DOES A MAST TAPER
TOWARD THE TOP?**

A mast tapers toward the top because the first mast was a tapering tree-trunk and because the strain lessens toward the top. If a mast were as thin below as above, it would probably break near the deck under the force of the wind. If it were as thick above as below, the weight of the upper half would put more strain on the lower half, and again there would

be a tendency to break. The sails, too, are always so cut and arranged as to put less strain on the higher sections of the mast. For these reasons, therefore, a mast is always made to taper toward the top.

WHY ARE SOME CHIMNEY POTS VERY LONG AND BENT?

Some chimneys are specially apt to be nuisances through the wind blowing directly down them and driving the smoke out into the room. It is usually to prevent this that chimney pots are bent. But some chimneys, besides being bent, are of extraordinary length. This is to prevent the smoke from being a nuisance to the tenants of a neighboring building.

HOW CAN WE JUDGE REAL OR PICTURED DISTANCE?

Mainly we judge distance by experience. For instance, a square box, as seen by us, is made up of lines running at various angles. This is true when we look at it, and a picture of it simply copies the direction of these lines. If we did not know that that was what a square box looked like, we could not tell its shape. A small child who has no experience is quite unable to tell.

A very young child, just beginning to observe, cannot tell distance, either in a picture or in a real thing, because it has not yet learned that lines running in certain directions mean this or that shape for the thing we are looking at. People who have been blind all their lives are similarly puzzled if sight comes to them. It was long ago pointed out by observers of the mind that after the very beginning of our lives we never get a pure sensation of vision, whatever we look at, because we are always influenced by memory and experience, and so the eye contributes something of its own to what we see.

CAN WE BREAK OURSELVES OF BAD HABITS?

Of course we can. But we must know what we mean when we speak of habits. Breathing and eating might be called habits, and we cannot break them, for they depend on the very structure of our bodies. But real habits are things learned, and are not essential. As they can be learned, they can be unlearned. We can learn the new habit of *not* doing the thing we were in the habit of doing. The bad habit of taking alcohol and other drugs which poison the body can

be completely broken. People always profess astonishment when "the habits of a lifetime" are changed. But, as a matter of fact, this happens every day, and is true in some respect or other of most people.

WHY DOES A BEE MAKE A HUMMING SOUND?

The bee's humming is made by the movement of its wings. Its wings move very quickly, and as they move to and fro they set the air moving, too, and it is the waves in the air that make the humming.

If the waves are too slow, as when you wave a stick in the air, or when a bird flaps its wings, we hear nothing. If they are too fast we cannot hear them. There are many sounds we cannot hear, as there are many colors we cannot see. But the vibrations in the air made by the bee's wings are at a rate that is within the range of our hearing, if the bee is near enough, and so we hear a humming. You will guess that that word, like the word "murmur," is made to imitate the sound it describes.

WHY HAVE THE EGGS OF BIRDS SO MANY COLORS?

The differences in color depend on the presence in the shells of various coloring substances, and it is interesting to see how a particular kind of bird always produces the same kind of color in its eggs, just as it produces a particular kind of color in its feathers. This probably depends on the particular chemistry of the body of the bird. The color of the shell is really as special to the particular bird as any of the things by which we know one bird from another.

If we compare the colorings and markings of a great number of eggs with the places in which they are found, we discover that in a large number of cases the eggs are so like their surroundings that they are difficult to see at all unless we look closely. For instance, a ringed plover's egg has the same general coloring as the sand on which it lies, and it is spotted over with black dots which look like tiny shadows. This makes it difficult to see the egg at all. In other cases the blotches or markings on the eggs look like an irregular piece of dark material lying, perhaps, on the beach or in the grass. For this reason they may be overlooked by an enemy.

THE NEXT WONDER QUESTIONS ARE ON PAGE 1239



Spenser reading one of his poems to Sir Walter Raleigh.

GREAT WRITERS OF SHAKESPEARE'S TIME

WHEN you go to Italy and visit Turin, you will stand on a hill outside the city—a hill crowned by the burying place of the Italian kings—and you will see far off, arching you round, a great half-circle of snowy Alps. Here and there the ring of mountains sinks almost to a gap; then rises into a peak; sinks again to a level bank of whiteness; from which, presently, it sweeps up and up into a huge icy pyramid that seems to pierce the very heavens. After that it falls lower for a distance, but rises farther on into quite a cluster of mountain-tops, and so goes circling round, now higher, now lower, though never again so high as the sovereign peak of ice and light.

The risings and declinings of English literature, judged by the best books, resemble that irregular mountain ring, in which distances between the peaks are spaces of time.

Far off this panorama begins, with dimly seen prominences like the Saxon Cædmon. Then there is a long, low dip representing five hundred years, before the sky-line swells up into the first peak that can be called high, and that is well within our range of sight. That first commanding mountain stands for Chaucer. Now follows another decline, representing two hundred years; but as the range goes on it begins to rise and rise, and, ever rising, climbs at last to the loftiest of all the heights of

literature—the sky-piercing summit of mankind's thought.

That is Shakespeare.

The length of time to be represented after Shakespeare is only three hundred years, and it has been filled with a glittering cluster of lofty mountain forms, none, however, approaching the height and majesty and grace of the Shakespearian eminence.

Two hundred years after Chaucer had founded modern English book-writing—that is, by the year 1600—our language had attained a glory unsurpassed. How was that rapid and wondrous growth brought about after so many barren centuries?

Glancing broadly over the world's history, we can see there have been periods when the human race has seemed to be worn out, stale, joyless, timid, with no fresh thought bounding toward hope and happiness. And then a period has followed when some part of mankind has been inspired by new life and has rushed the old world forward again, thrilling with fine feeling and eager expectation. It was so in the centuries that followed the life of Jesus. It was so in the century before Shakespeare.

Perhaps no age, unless it be our own, has ever been quite so wonderful as that century before Shakespeare. Great changes came to pass almost at the same time and acted on each

other. The approach of the Turks toward Constantinople drove the ancient learning of Greece and Rome, preserved in Greek and Latin, back to Italy for shelter, and men began to study eagerly the perfect writing of a thousand years before. At the same time printing was invented, and spread swiftly the means and the fashion of study. Immediately afterward America was discovered, and the energetic began to feel that they were called on to explore not only an old-world history they had forgotten, but a new world of travel, of which they had been unaware. Love of knowledge became a passion.

A GREAT LOVE OF BOOKS GROWS UP AMONG THE PEOPLE

Books were regarded as treasures, and crowds gathered to hear them read. The beautiful English Bible was the sweetest music ever heard on English soil, and the people listened to it gladly, as the precious book was read to them in churches, on the village green, or in the market square. The writings of far-off lands and generations were translated, and the lives of the great men of those days were retold. All the history and the tales that could be gleaned from the past were worked up into plays, and were watched with unflagging delight by people anxious to feel their new thought and hopeful energy. Admiration of the books that had brought thought from other days led men to wish to write books themselves. Delighting in reading, they began to delight in writing, too, and to hope that through their writings their names might be long remembered.

HOW THE WORLD WAS PREPARED FOR THE COMING OF SHAKESPEARE

How extraordinarily the world was prepared for the coming of this great man we may see by examining a few dates. In the writings of Sir Thomas Wyatt, the Earl of Surrey and others, Italian forms, such as the sonnet, had been adopted, and English verse had been polished and made varied; and these new forms of poetry were available for anyone to study, for the first collection of English poems, by many writers, Tottel's Miscellany, was published seven years before Shakespeare's birth. The best collection of such early poems, the *Paradise of Dainty Devices*, was issued when Shakespeare was twelve years old; Hall's *Chronicle*,

to which he went for parts of his English history, was printed twenty-two years before his birth; Holinshed's *Chronicle* appeared when he was thirteen; Stow's *Annals* when he was sixteen; and Plutarch's *Lives*, from which the poet took much of his ancient history, was translated when he was fifteen. Thus the materials for his work were ready.

Yet five years before the death of Queen Elizabeth, if anyone had asked in London who was the greatest poet of that time, when English literature was approaching its topmost height, the answer given would not have been William Shakespeare. The answer of the poets themselves, and they were many, would have been Edmund Spenser.

And we can understand, though no one would give the same answer now, that it was a natural reply to give then, and not absurd. For poetry had not at that time begun to include plays as the most splendid part of her wide domain.

Blank verse, the form in which our grandest poetry is written, had only recently come into use, and had not been enriched with the finest thought in the world of books outside religion. Poetry then was rhymed verse, and the greatest mass of English rhymed verse, sweet beyond all other verse in the English tongue, had been written by Edmund Spenser. If we were still thinking of poetry as rhymed verse only, or chiefly, we should give Spenser a place on the list of poets alongside the greatest.

So we must not pass him lightly by. He was the one great poet between Chaucer and Shakespeare—a period of 200 years—and he had as lasting an influence on English poetry as Chaucer had. Chaucer fixed the language and made it melodious; but his melody had not been sustained. Spenser revived the melody of our tongue, and so added to it that his tunefulness has been echoing through English poetry ever since. He is known especially as the poets' poet.

There are two reasons for that distinction. One is that nearly all his poems are purely fanciful. They do not deal with human life and character, as poetry did when it again enlarged its bounds by taking in great plays, as in the far-off days of the Greek drama. Spenser's poems are concerned with pleasing creations of the mind, dainty fancies, pretty parables with graceful and often useful

meanings; but they are not concerned with the common stuff of plain life. It takes a poet to appreciate them fully. And then, again, they are deliciously sweet in their wording, and that feature can be appreciated best by fellow-poets.

Yes, to the men of his own day he was their leading poet, though Shakespeare was alive, and no doubt knew Spenser. They did not quite overlap. Shakespeare was twelve years younger than Spenser, and was a lad of fifteen when Spenser was acknowledged as the poet of his period. When Spenser died, thirteen years before Shakespeare died, the greater poet had not written his greatest works, and, indeed, Spenser in his *Tears of the Muses*, referred to "our pleasant Willy."

That same gentle Spirit from whose pen Large streams of honey and sweet nectar flow, was not writing what made his fame. It is now Spenser himself who somewhat more than satisfies us with his "honey and sweet nectar," while Shakespeare's genius left to all succeeding ages, is unsurpassed.

LONDON BOY WHO WROTE A CALENDAR FOR COUNTRY MEN

Spenser was London-born from a Lancashire stock, and on leaving Cambridge sought a career at the court, where he was a friend of Sir Philip Sidney, and associated with the Earl of Leicester, an acquaintance that did him no good when that nobleman fell from royal favor.

Before he obtained official employment as Secretary to the Lord Lieutenant in Ireland, he had published his *Shepherd's Calendar*. This is a pastoral poem that gave him the first place among contemporary poets, and showed his skill in using a wide variety of verse forms while commemorating the months of the year.

The *Shepherd's Calendar* is an entirely artificial poem, as far from real life as the make-believe play of imaginative children. It showed at least that Spenser had a quick sense of style in writing, and style was much admired in the days when the old literatures of Greece and Rome were being revived, and the newer literature of Italy was setting the fashion.

THE GROUP OF KINDRED SPIRITS WHO BRIGHTENED THEIR AGE

Spenser's greatest friend was Sir Philip Sidney, himself a poet and a most elaborate stylist in prose writing. Also Sidney was a man of singular purity of character and nobility of spirit, and Spenser showed himself a kindred spirit in all his

writings. Walter Raleigh was another member of the same company. What a knightly group they must have made—Sidney, Spenser, Raleigh! Perhaps Sidney was fortunate in his early death, for he left a spotless name; while Spenser and Raleigh lived on into grave misfortune.

Sent to Ireland, then a land of strange violence, the poet felt himself to be in exile; but his value as a secretary was known—he proved it by writing a prose book on the state of Ireland—and he was kept there in spite of all his plans for release and for employment under happier surroundings.

It was in Ireland that he planned the twelve books of his *Faerie Queene*, the fanciful poem that preserves his fame; and there, too, he wrote six books of this work which still exist. Some of the poem was lost, and the rest not completed.

Spenser's weaknesses as a writer were, first, that he had not the power of making a clear and manageable tale, but became involved as "in endless mazes lost," and then that his writings were far off from real life. He lived in a twilight of romance, amidst shadowy figures. And, as suited this fanciful world of the mind, his language was continuously sweet and melodious, with words as well as tones that were, even then, purposely old-fashioned.

THE POEM OF THE FAERIE QUEENE WITH A REAL QUEEN IN IT

And so he has sweetness without strength. But sweetness was what our literature needed just then. It had had more than sufficient ruggedness in the immediate past as it was splashed forth from the spluttering pens of poets like John Skelton.

The *Faerie Queene* suited the age for which it was written, an age that has Sidney's *Arcadia* as its most popular prose romance. The poem was really a poetical dressing up of the old entertainment that was called a morality play. Certain virtues and their opposing vices were pictured as knights or ladies, or as monsters or tempting witches, and engaged in mildly adventurous contests.

Thus Holiness, Temperance, Chastity, Justice, Courtesy and other kindly figures came into contact with Falsehood, Pride, Unbelief, Lawlessness and other harmful influences, amid surroundings that are wholly fanciful and strange. The poem is a collection of allegories, but it is complicated by the characters' having a

second meaning beyond their moral teaching. The chief of them were designed to represent living people, with Queen Elizabeth as the centre of the group. All this personal reference is useless lumber now, and only some of the moral application remains; but what is left of real value is much pure poetry in melodious words. Spenser, indeed, bequeathed to those who have followed him a style worth knowing, but to be used with discretion.

THE POETS WHO FLUNG THEIR POEMS AND PENS INTO SPENSER'S GRAVE

How well his fellow-poets appreciated him was seen when, driven from Ireland in great danger during one of the insurrections that broke out, he arrived in London ill and impoverished, and there died before his sorry plight was fully understood. His funeral in Westminster Abbey was attended by a gathering of his fellow-poets, who, acknowledging him as a master in the divine art, threw their pens and poems into his grave.

As examples of the mellowness of Spenser's fancies and of the tones in which they are expressed, we may take two scenes in which the good people he pictures are being lulled into a sense of peace and security in order that they may be the better tempted. The first is a gentle knight who finds himself resting in a magician's hut while passing through the wandering wood of Error.

And more to lull him in his slumber soft,
A trickling stream from high rock tumbling
down,
And ever drizzling rain upon the loft
Mixed with a murmuring wind, much like
the sound
Of swarming bees, did cast him in a swoone.
No other wise, nor people's troublous cries
As still are wont t'annoy the walled town
Might there be heard; but careless Quiet
lies
Wrapt in eternal silence far from enemies.

THE MAJESTIC STANZA INVENTED BY EDMUND SPENSER

This is the nine-lined verse which Spenser invented, and which, known as the Spenserian stanza, has been used by many later poets, notably by Byron in *Childe Harold*. It consists of eight lines, each with ten syllables or five beats, followed by a ninth line of twelve syllables, or six beats, that ends the stanza with a lingering, restful sound that may with the use of dignified words become majestic. An even better example is to be heard in the description of the Bower of

Bliss of an enchantress, where all kinds of sweet sounds unite to charm those who are being tempted to their ruin.

Eftsoons they heard a most melodious sound
Of all that might delight a dainty ear,
Such as at once might not on living ground
Save in this paradise, be heard elsewhere.
Right hard it was for wight who did it hear
To rede what manner music that might be;
For all that pleasing is to living ear
Was there consorted in one harmony—
Birds, voices, instruments, winds, waters, all
agree!

THE MOST BEAUTIFUL WEDDING POEM IN THE ENGLISH LANGUAGE

Besides his *Faerie Queene* and *Shepherd's Calendar*, Spenser wrote with equal sweetness on love in its most refined forms.

His *Epithalamion*, written to commemorate his marriage when he had reached the substantial age of forty-two, is the most beautiful poem of its kind in the English language. It overflows with admiration of his bride's beauty, alike in form and character. His *Prothalamion*, hymning the marriage of two pairs of friends, is scarcely less successful. In it Spenser tells, in outline, the story of his own life, for he is one of the poets who has not hesitated to intermingle his personal affairs with his poetry and so provide us with facts that otherwise we might not have known. Even his courtship is traced in the sonnet form which he was foremost in introducing from the Italian tongue.

His personal poems, *Mother Hubbard's Tale*, and *Colin Clout's Come Home Again*, expressing his longing to leave his Irish exile, and the *Tears of the Muses*, regretting the decline of poetry—a bad instance of misjudgment—are all interesting historically; but it is his mixture of dainty fancy with the melody of words that gives him a secure place in our literature. As has been said by a fine critic, in words worthy of Spenser himself, in the pageant of the English poets Spenser should ride on a white horse and blow a silver trumpet.

RICHARD HAKLUYT, WHO WROTE OF THE ADVENTURES OF HIS TIME

Richard Hakluyt is a man whom we do not often think of among the great writers of Elizabethan times, though it is to him that we owe the best description of the voyages and adventures of those stirring days. He was born, probably in London, about the year 1553, and at-

FIGURES FROM SPENSER'S POEM OF CHIVALRY



An incident from Spenser's *Faerie Queene* wherein the Princess Britomart, disguised as a knight, rescues the Lady Amoret. Afterward Britomart becomes the wife of Sir Artegall, a brave Cornish knight.

tended the great school at Westminster. When he was about seventeen he went to Christchurch College in Oxford University, where Sir Philip Sidney had already spent two years, and where the two youths met and became fast friends. Hakluyt, however, stayed on at the university long after Sidney left it. He took the degree of Master of Arts and entered the Church.

His great interest for us is in his work in geography, in which he had been in-

gathering of his friends, we should have met such great men as Francis Drake, the Howards, the Frobishers and Raleigh.

Hakluyt's influence had much to do with the settlements by the Virginia Company, and if he had wished to make the adventurous voyage, he would have been the first clergyman in Virginia. He died in 1616, a few months after Shakespeare, and was buried in Westminster Abbey.



Edmund Spenser was the herald of a great revival in English poetry. In his poems we see the last traces of the English language as it was written by Chaucer, while he has brought the modern English, soon to blossom in Shakespeare's poetry, within sight of perfection. Spenser at one time of his life experienced good fortune and was a friend of many eminent men, although he died in poverty. In the above picture we are shown the poet in his happiest days, reading some pages from his newly written *Faerie Queene* to Sir Walter Raleigh, who probably recalled these days later in the Tower.

terested in his boyhood by his cousin and namesake, another Richard Hakluyt. After he left the university, he began to lecture on geography and wrote a book on the discovery of America. Later on, he was sent to Paris as chaplain to the English ambassador, and while in Paris he learned all that he could about the discoveries made by the French and Spanish. After his return to England he devoted most of his time to the study of geography. He wrote many books, the greatest of which is *The Principal Navigations, Voiages, Traffiques and Discoveries of the English Nation*.

It is said that he knew all the great sea captains and merchants of his time, and if we could have been present at a

THE INFLUENCE OF THE THEATRE IN SHAKESPEARE'S TIME

In the great days of which we are reading, and to which we owe so much, the theatre meant much more than, for instance, the motion-picture theatre means in our own. Hearing and seeing plays was not only the recreation of the people: it was what the reading of newspapers and histories and fiction is to us. The music of the Bible and the Book of Common Prayer had accustomed the people to stately and beautiful language, and they listened gladly to the lines written by the great dramatic poets.

Spenser, who was not a dramatic poet, never wrote a play, and when he first made poetry, the stage did not offer

HOW THE BIBLE WAS READ TO THE PEOPLE IN SHAKESPEARE'S TIME



Preaching from the beautiful English version of the Bible at the village cross in Tudor times.—From the painting by Mr. G. E. Robertson.

much inducement to a man of his genius and ambition. It was not until he was a young man of about twenty-four, about to leave the university, and Shakespeare a boy of twelve, that the first theatre was opened in London. It soon became fashionable, however, and before long, good writers turned their attention to preparing plays for the enjoyment of the gay world of London.

We know the names of several of these writers, but we have time in this story for only the most noted. Of these, the man who comes next in importance to Shakespeare is Christopher Marlowe. Shakespeare owed more to him than to any other man of his time, and the poet Milton also owed Marlowe a great deal.

CHRISTOPHER MARLOWE, FROM WHOM SHAKESPEARE LEARNED MUCH.

Christopher, or Kit, Marlowe, who has been called the father of English tragedy, was born the same year as Shakespeare, in Canterbury, where his father was a shoemaker. When he was a boy he went to the King's School in Canterbury and from that school went with a scholarship to Cambridge University. After he took his Master's degree, Marlowe went to London, where Shakespeare was making a name for himself as an actor.

In London he made friends with Sir Walter Raleigh and some of the other well-known scholars and writers of the time. We really know little, however, about the years that he spent there, except that he must have given much of his time to writing plays and poems, and that because of some of his opinions he got into trouble with the authorities. In the summer of 1593 he got into a street-row. He was fatally injured in the fight, and the man who was one of the great English poets came to a tragic end in his thirtieth year.

His fame has been overshadowed by Shakespeare and Spenser, and his life was cut short before he had shown all that he really could do. Nevertheless, we must count Marlowe among the greatest English dramatists, more especially because no good plays had been written before his time and he had no one to show him the way. He wrote a great deal of sweet poetry and a number of historical tragedies. In these tragedies he adopted the use of blank verse, about which we may read on page 100. Ever since his time

blank verse has been used for dramatic and epic poetry, but we must remember that it was Marlowe who first made it smooth and fitted it to the beauty and dignity of the English language. His plays often rise to grandeur, and though they are now never acted on the stage, the best of them are counted among the treasures of our great literature. Shakespeare worked with him at first, and learned from him, and it is believed that Marlowe wrote part of Henry VI.

Marlowe's example in writing plays for the London stage was followed by an old writer named Robert Greene. Like Marlowe and Spenser, Greene was a graduate of Cambridge University, which he entered the year before Spenser took his degree, and it is just possible that the two men met there. After he left the university, he went to London, where he occupied himself in writing. Although he wrote some plays, he is chiefly remembered as a bitter critic and as the writer of stories which are still read by students of life in Tudor times. Through his own fault, Greene had a very unhappy life and died in great poverty in his thirty-second year.

MICHAEL DRAYTON, ONE OF SHAKESPEARE'S FRIENDS

A man of whom we can think with greater pleasure is Michael Drayton. He is chiefly famous for his historical poems and ballads, one of which, *The Battle of Agincourt*, you may read in the *Book of Poetry*. Drayton, who had been page in a great family in his youth, was a favorite at Elizabeth's court. His chief interest for us is the fact that he was probably one of Shakespeare's friends and was certainly a friend of Ben Jonson.

FRANCIS BACON, A GREAT WRITER AND PHILOSOPHER

Another writer of Shakespeare's time whom we must mention, although he was not a poet, is Francis Bacon, who was born in 1560 in London. He went to Cambridge University when he was only twelve years old and spent three years there. Though he left the university without taking a degree, he was a deep student and became a lawyer, a statesman and a great philosopher. He aimed at making himself master of all knowledge, because, as he said, he thought himself born "to be of advantage to mankind." In 1618 he was made lord chancellor by James I, but a few years after, he was

accused of taking bribes. He admitted that he had received gifts from suitors in his court, and was dismissed from his high office and disgraced. Then he went down to his home in the country, and went on with the search after knowledge, which was the real love of his life, and also the cause of his death. He believed that food could be preserved by cold, and one day, when out driving, he stopped his carriage to buy a fowl and stuff it with snow. But he was by this time an old man and not strong, and standing in the snow, he got a chill from the effects of which he did not recover. He died on April 9, 1626.

During his life he wrote many learned books on law and on philosophy. The books by which he is best known are his *Essays* and a philosophical work which he called *Novum Organum*, or *A New Method*, because he believed he had found a new way of teaching science.

BEAUMONT AND FLETCHER, THEIR FRIENDSHIP AND THEIR PLAYS

Beaumont and Fletcher, who are always spoken of together, were two dramatists who wrote plays together. John Fletcher was the son of a bishop of London, and Francis Beaumont the son of a judge. Each of the poets entered the university at the age of twelve, but Fletcher went to Cambridge, and Beaumont attended Oxford University.

When Fletcher was about sixteen, his father died, leaving his family in great poverty. The boy had set out to seek his fortune, and we know nothing of his life for the next eleven years. It is supposed that he went to London to gain a living by writing. Beaumont, who was about nine years younger than Fletcher, left Oxford, without graduating, to study law in London. Literature, however, had greater attractions for him than law, and in time he, too, turned to writing. It is thought that Ben Jonson introduced the two poets to each other about the year 1606. Their friendship became as close and beautiful as the friendship of David and Jonathan, and they wrote plays together until Beaumont died, about two months before Shakespeare's death. Fletcher died of the plague in 1625.

The plays written by the friends are very fine. It is said that in their own day they were performed oftener than Shakespeare's, but they are not so well suited to our times as the plays written

by that greatest of all the world's great poets.

"O RARE BEN JONSON," LAST OF THE POETS OF SHAKESPEARE'S TIME

Ben Jonson, who bridged the gap between Shakespeare and Milton, had a longer and more adventurous life than any of the other writers of whom we have been reading. He was born in Westminster in 1573, and as his father died about the same time, he was an orphan from his birth. His mother married again, however, and his stepfather sent him to a good school for boys. From this school he was taken to Westminster School, at the expense of William Camden, a learned scholar, who was one of its masters, and at Westminster he gained not only a sound education but the habit of study, which made him one of the most learned writers of his day. After he left school, he was sent to learn bricklaying, his stepfather's trade, but soon grew tired of that and went as a soldier to the Netherlands to help to fight against Philip of Spain. After a time he returned to England and became an actor. Like Shakespeare, he soon began to revise some of the old plays in which he acted, and before long began to write new ones himself. His genius was not so great as Shakespeare's or even Marlowe's, but he was one of the important writers of his day, and his plays were acted for a long time.

He was rather a quarrelsome man, and was imprisoned once for killing another man in a duel. Later in his life he was again put in prison on account of something he had written in a play, and once he went to prison with some friends who had been sent there for something said in a play that he perhaps helped to write. In this he showed both generosity and bravery, for he believed that he ran the risk of having his ears cut off.

He perfected in English the form of entertainment called a masque, which had been introduced from Italy, and of which we may read in the story of Milton. He wrote a number of these masques, as well as comedies, tragedies and many other poems of great beauty and sweetness. He outlived his friend Shakespeare by twenty years, and when he died, in 1637, he was buried in Westminster Abbey, where his tomb has the inscription "O Rare Ben Jonson." He was the last of the great poets of Shakespeare's time.

THE NEXT STORY OF LITERATURE IS ON PAGE 1235.

TWO INTERESTING AMERICAN ANIMALS



The woodchuck is one of the commonest burrowers of Eastern North America. Its burrow is quite elaborate and slants upward so that water cannot enter. Farmers hate it because of the damage it does to crops. During the winter it hibernates, but sometimes comes out too soon.



The wild animals we call rabbits are truly hares. This is the common rabbit or "Molly Cottontail," found from the Atlantic to the Pacific. It is a timid creature which makes a "form" or nest among the leaves or grass, usually in the shelter of some shrubs.

Pictures, courtesy of the American Museum of Natural History



Beavers building a dam.

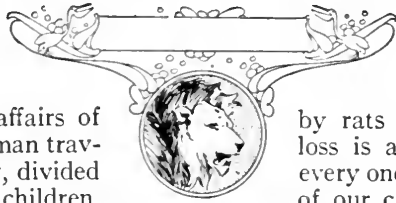
GNAWERS AND BURROWERS

THE Parable of the Talents applies with the same justice to the affairs of animals as to the affairs of men. Nature, like the man traveling into a far country, divided her gifts among her children, and chapter by chapter we see to what account those gifts have been turned.

The rodents were marked off from the rest of created things by a single four-fold talent. It consisted of four superb live chisels growing in the mouth, two in the upper jaw, two in the lower. They have grinding teeth, of course, teeth in the hinder part of the jaws; but the incisor teeth are the means by which the rodents have gained in importance.

With four teeth they have achieved more than the manlike apes have compassed with four hands. The gorilla has not put his talent to fruitful account. Like the sluggard in the parable, he has hidden it, not in the earth, but in the tree-tops. The rodent, however, with those fine chisel-teeth, has gnawed his way to almost world-wide possessions.

In fact, the rodents are so many in species, so countless in numbers, as to form the greatest problem in the relations between man and the animal world. These thriving billions are more destructive of human fortunes than all the lions, tigers, elephants,



wolves and wild-dog forms.

One estimate of the damage done by rats says that the average loss is about three dollars for every one of the total population of our country. Certainly the

amount is many millions of dollars. The mouse, which is far more numerous, is believed to cause almost as great a loss.

How, then, can such an order find favor in human sight? The answer is that rodents are old and civilization new. They housed in the earth and made homes in the trees before man built a house. They helped to prepare the world for our coming.

They were husbandmen and caretakers before our rise; and now they insist on sharing with us. We were the first invaders, theirs the territory taken. They have clung to their ancient homes and, in return for our intrusion upon them, some have boarded our vessels and sailed with us wherever ship could sail.

The account is not all one-sided. Squirrel, chinchilla, musquash, hare and rabbit surrender life to clothe as many people as can buy furs, and there would be a deficiency in food supply if the flesh of rabbits and hares were no longer available.

It is true that red squirrels take young birds in their nests and steal the bait from the traps which the trapper

has placed so carefully. They also steal the stores of other animals.

All the squirrels damage trees by nipping off the young branches as they bud forth. In common justice let us remember that the squirrel, and that other forester, the jay, gave us our woods. They bite down a growing tree's new limbs, but they plant the acorns and nuts from which our oaks and beeches mainly spring.

Moreover, the richest farm land in the world, the wonderful black loam of the West, was prepared for cultivation by the labor of countless generations of rodents in mixing up decaying vegetation with the underlying soil. Similar land in Russia had a like origin.

It is impossible to view with resentment the group which has the dainty squirrels at its head. The little beauties have a multitude of cousins. First come peculiar little African animals whose tails, furnished underneath with horny projections for use in climbing, cause them to be named squirrels.

THE SQUIRREL WITH ITS COAT OF BRILLIANT COLORS

They are not squirrels, but little creatures that have grown up looking like them; and as they must have a name, they are called squirrels, though science prefers to name them simply scale-tails. Some of them are mouse-sized, some are fourteen inches long. The tiny squirrels of Abyssinia and elsewhere have horny prickles among their fur, like the tenrecs of the insectivore group.

Pleasanter to handle are the palm squirrels, which add insects to a general diet, and with delightful impudence enter human habitations. More formidable are the big species whose proportions—a full foot from the nose to the root of the long and bushy tail—entitle them to their description of giant squirrels. They belong to that forcing-house of animal life, the Indo-Malay countries, and one of the species has the distinction, rare among mammals, of a coat of brilliant colors during the courting season.

The European red squirrel, ranging from Ireland to Japan, and from Italy in the south to Lapland in the north, has a slight change of color. His foxy red coat of summer sobers down for winter by an admixture of grayish white hairs. In the warmest part of its wide range the common squirrel does not hibernate.

In Britain and elsewhere, however, the

squirrel has the daintiest of nests in which to winter snug and secure in a tree. So long as he is well conditioned he sleeps away the day and night. When hunger urges he awakes, pops down to one of his storehouses in the ground, extracts his nuts or acorns, recharges his clamorous little stomach and goes back to bed.

THE GRAY SQUIRREL THAT THRIVES IN THE LONDON PARKS

America has a red squirrel, redder than the European, called the chickari, or chickaree; but the common species is the gray squirrel. By an astonishing freak of acclimatization London knows more of this squirrel than of any other variety.

Early in the present century there was a surplus of squirrels born of a few introduced from the New World, so some were released in Regent's Park and Richmond Park. By every law of probability the little explorers ought soon to have been destroyed. But no, they have increased beyond all reckoning, and have driven out the native red squirrels.

The conquest is not by right of battle. Apparently it accords exactly with Darwin's theory of the struggle for existence. The gray seem more enterprising than the red, and observation suggests that they plunder the stores of the English species, leaving these to starve or retreat. The largest American squirrel is the fox, or cat, squirrel, nearly two feet from nose to tip of tail, but it is growing rare. There are several varieties of gray squirrels, and occasionally some specimens are quite black.

THE SQUIRREL ENGINEERS THAT BUILD THEIR HOUSES UNDERGROUND

Between seventy and eighty species of squirrels are known, and we must go below ground to find many of them. The chipmunks, common to the Old World and New, are ground-squirrels which store food in their subterranean homes, have additional supplies in secure places above ground, sleep the best part of the winter away, and come out from time to time when a rise of temperature takes place.

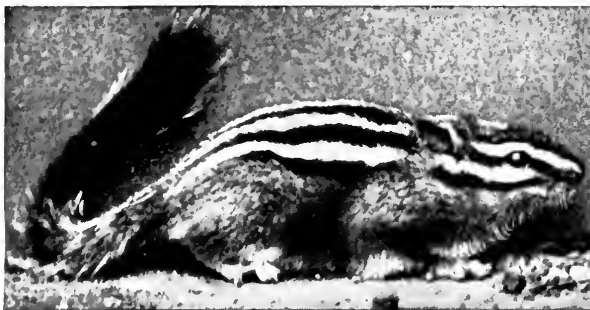
Allied forms are the suslik of northeast Europe and northern Asia, and its counterpart, the striped gopher of North America. Expert underground engineers, they feed on roots, grain and fibres, occasionally on poultry and carrion.

They are as social as bees, and have admirable underground residences, and are vigilant sentinels out in the open. But

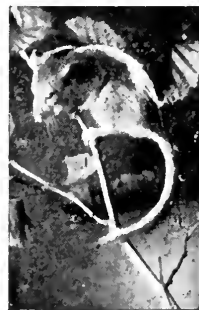
PORTRAITS OF THE RODENT FAMILY



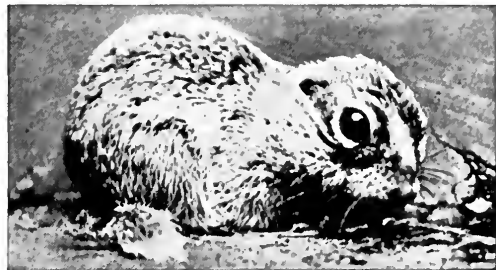
Red Flying-squirrel.



Four-banded Chipmunk.



Dormouse.



European Suslik.



European Hamster.



American Flying-squirrel.



Gray Squirrel.



Beaver.



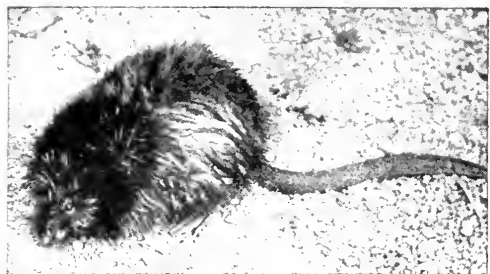
Hairy Bamboo-rat.



Cane-rat.



Egyptian Jerboa.



Musquash.



Patagonian Cavy.



European Rabbits.



Aguti.



Coypus.



Hairy-footed Jerboa.



Viscacha.



Harvest Mouse.



Water Vole.



Salt-marsh Cavy.



House Mouse.



European Red Squirrel.



Indian Brush-tail Porcupine.



Norwegian Lemming.



Guinea-pigs.



Capibara.



Brown Rat.



Black Rat.



Chinchilla.



Prairie-marmot.



Giant Squirrel of Malabar.



Hare.



Alpine Marmot.



Canadian Tree-porcupine.



European Crested Porcupine.

here the prairie-marmots, commonly called prairie-dogs, excel them, for these burrow to such an extent in the soil that their colonies are termed towns.

The towns of these marmots in western United States sometimes extend for miles. Around every hole is a raised mound of earth, and sentinels are constantly on watch. The stories we used to hear of rattlesnakes and owls living in peace with the marmots are not true. Both of the intruders eat young marmots.

But what when civilization wants the homes of prairie-marmot or suslik? In southern Russia, especially in the region of the Don, the suslik takes one quarter of the wheat crop. Suppression of susliks was made compulsory there, as wolf-slaughter once was in England. In 1914 nearly eight million susliks were destroyed, and thirty million burrows were "gassed" with violent poison. During the World War the Don women were organized like soldiers to fight these rodents.

Fortunately no such charge can be levied against the common marmots of Europe. They keep to the Alps, the Pyrenees and the Carpathians, where everything grown is the bounty of nature. It is well, for an Alpine marmot is an animal as much as twenty inches long, not counting the tail, and it has an appetite to match its inches.

One of the marmots, the bobac, which extends no farther west than the eastern frontier of Germany, is not to be mentioned without a shudder. Plague, which has again and again swept like a slow fire over Europe and consumed half the population, comes from a virus-bearing flea carried by the rat. But it originates with the bobac marmot.

Apparently the bobac is immune to the effects of the evil that it carries. Somehow, somewhere, the infected insects reach the rat and travel far and wide. The rat dies, and then only does the flea forsake it, to leap upon a human being and with one bite sow his blood with deadly bacilli.

THE FLYING-SQUIRRELS AND THEIR WONDERFUL PARACHUTES

We are still with the squirrels, and come now to the most interesting—those that got so far toward flying as the development of a parachute of skin, extending from the fore limbs along the sides to rearward. We have four varieties of flying-squirrels in North America, but the largest belong to Asia.

Many varieties of squirrels have this method of so-called flight. Some of them measure only a few inches along the body; others, the *Pteromys*, have a body length of twelve inches and more; while one, the *Eupetaurus cinereus*, a native of India, clothed in a dense woolly coat, is eighteen inches long.

THE MARVELOUS WORK OF THE BEAVER IN BUILDING DAMS

All flying-squirrels plane down from a height, flatten out and glide to a much lower point. Some of them cover 250 feet at one swoop.

Squirrels claim our warmest affections, but of all rodents the beaver commands our admiration for animal genius. As an engineer he has no peer save among men and the social insects.

There are only a few beavers left in Europe, but there are more in Asia. The so-called Canadian beaver is the most numerous of several varieties in North America, but it is now uncommon in the United States. It is our largest gnawing animal, with short, powerful legs, webbed hind feet, strong, sharp teeth and a broad, flat tail. The story that they use the tail as a trowel to plaster down mud is probably untrue.

His schedule of needs is modest: a hut or lodge above water, with an outlet from which he can enter water unseen; a constant supply, winter and summer, of twigs, bark, roots and juicy wood for his food. To gain these he becomes an engineer.

With those superb gnawing teeth of his he bites through trees, cuts them into logs, pushes these into the water, fixes them, builds logs, branches, stones, mud across the stream, and so makes his dam. He leaves open spaces at the summit as sluices to let excess water escape. He makes his dam bow-shaped, with the bow facing upstream, so opposing the greatest possible resistance to the thrust of the water.

THE LITTLE ENGINEER OF THE WATER AND HOW HE BUILDS CANALS

Architects almost worship the man who made the first arch of masonry, but this humble rodent had been shaping the outline in water for millions of years!

As trees grow scarce by the river margin the beaver works inland and fells more. Lacking strength to push or pull his logs over dry land, he digs canals, lets in water from the pool and floats his logs down them. Or, still farther inland, he con-

structs a series of channels to drain water down to a main canal, and so still navigates his timbers to the river.

Their houses are roughly built of sticks and brush, plastered with mud and sod. Just before cold weather comes they are plastered anew with mud, which freezes and makes a roof which few enemies can break through. Their greatest enemy is man, who hunts them for their beautiful fur, which is greatly prized. As the country becomes settled, man objects to having the meadows flooded and breaks down the dams. The beaver seems doomed to disappear.

THE GREAT MOUSE AND RAT FAMILIES

These are feeble folk, small in size and strength, but great in numbers. They have many enemies, but, nevertheless, continue to thrive in spite of them all. Some are close kin to the squirrels, some to the gophers; while others look like kangaroos. The common house mouse and the ordinary brown rat came with the first white settlers of America. They probably came from Asia originally.

In the huge assembly of mouselike animals, America has none of the dormice. These neat little creatures are confined to the Old World, and busy themselves at night as the squirrels do by day. They sleep soundly through the winter, but when on the move in summer nights their activity is unexcelled.

Dormice that have squirrel-like tails, tiny creatures that keep entirely to trees; garden-dormice that are said to share the pig and mongoose's defiance of snake-poison; and dormice of distinctive markings peculiar to Africa, lead us to India's specialty—the dormouse whose innocent-looking jacket hides spines as effective as the thorns of a rose.

A step farther and we reach the kingdom of little animals with hind legs shaped like those of kangaroos—jumping-mice and jerboas. Kangaroos always hop; these rodents walk in the ordinary way, but to hurry they are compelled to leap, using the hind legs as the kangaroos do.

THE ANIMALS ON THE FRONTIERS OF THE MOUSE KINGDOM

These animals are on the frontiers of the mouse kingdom; within the pale is a mighty group—true mice, rats, hamsters, lemmings and so on. Even Australia, lacking other modern mammals, has peculiar rats among her natives, rats as much

at home in the water as ours. Their gait is normal; but in the Old World gerbils, a terrible plague to cultivation in India and elsewhere, we return to jerboa-leaps made by hind legs.

They lead us to the least specialized of all the family, the hamsters, an ancient type from whose ancestors all the big battalions are believed to descend. The hamster inhabits Europe and Asia, and everywhere it is famous for its underground architecture, its cozy home, its neat galleries, its huge storage chambers. Into these chambers go the fruit of men's labor, so hamsters are much persecuted. All rodents, however, have many young in a year.

Old World rats, like the Australian, have representatives which spend a great part of their lives in the water, though they have their nests on the shore and there rear their young. They differ somewhat from the common rats of house and barn.

One water-rat, a South American species, copies the otter in living on fish of its own catching. Ours is pretty mainly vegetarian, but destructive to the bark of trees and to river banks in which it makes its long tunnels.

Great havoc is wrought, however, by both short-tailed and long-tailed field-mice. America has a great many of these. Sometimes they become a pest.

HOW THE LEMMINGS MARCH IN THEIR MILLIONS TO DESTRUCTION

Similar tides in the affairs of lemmings lead to those great fatal migrations of which we read from time to time. Prosperity brings excessive population and threat of starvation for all, so millions of lemmings sally forth to seek an imagined land.

They march straight forward, over hill and dell, through gardens, farms, villages, into wells and pools, to poison water and cause disease; on and on, lessened by strokes of death from starvation, injury, disease, and a host of birds and animals preying on them; on and on to the sea; then into the water to destruction.

Some few lemmings remain behind to repopulate the old haunts, and from these arise stocks which will in turn march to doom. It is sad and terrible, but if the dismal exodus did not occur, lemmings would long ago have eaten Europe bare.

The musquash, as the muskrat is often called, is capable of rapid multiplication,

but it has so many enemies about its home by river and marsh that it never becomes too numerous. Its fur is much prized now, though it was long despised. It does not hesitate to live near the homes of man. The rat brings a dozen diseases to us in addition to plague; it gnaws the feet and legs of live animals and birds, and is guilty of more attacks upon human beings than any other animal in the country. It is an atrocious pest, but engagingly clever—the nimblest-witted of all our foes.

Many species of rats and mice reward extended study: black, brown, striped, bandico-rats, mole-rats, bamboo-rats, sand-rats, cane-rats; striped mice, harvest-mice which construct globe-shaped nests on growing corn, dainty as fairy fancies; ratlike gophers which burrow and use their pocket-like mouths as hods to carry away excavated material; rats and mice resembling kangaroos; and many so uncommon as to have no popular names.

Nearest to these is a hare which resembles a jerboa, called the jumping-hare. Then we have the big coypu, a burrower and fine swimmer, familiar to us in shows as the giant rat; and the allied hutia couga, leading us to the porcupine.

THE GREAT PORCUPINE FAMILY AND THEIR WONDERFUL QUILLS

Common to West and East, the porcupine attains its finest development in the Old World, where it follows the ordinary rule as to rodent food, but is known to eat flesh and carrion, and even to gnaw bones and the tusks of dead elephants. Its splendid quills are weapons of defense; they cannot be shot out. When attacked, the porcupine erects his quills and charges backward, when the quills act as spears.

American porcupines, which have much shorter quills, are amazingly good climbers, and pass the greater part of their time in the trees, feeding on twigs and leaves. South American porcupines are so perfectly adapted to arboreal life that they are called tree-porcupines.

Big porcupines, middle-sized porcupines, porcupines like prickly rats have arisen in various parts of the world, and we find that a few steps lead us to their next of kin in such un-porcupine-like animals as the chinchillas, whose fur is so prized, and the viscachas, which colonize like marmots.

And so on to the agutis, the pacas and the cavies, from which last group all the guinea-pigs beloved of boys have been

derived; and away again to the maras, harelike rodents over a foot high and nearly a yard long; and the colossus of the order, the capibara, or carpincho, a native of South American rivers.

A rodent curiosity, the pica, slightly different from the rest in the matter of teeth, leads us to the hares and rabbits. The names hare and rabbit are commonly misused. The European rabbit is a burrowing animal, and its young are blind and naked at birth. From this all the fancy breeds have been developed by selection. The young hares are born above ground and can very soon take care of themselves. Our common North American rabbits are really hares, and the so-called Belgian hare is a rabbit.

THE AMAZING STORY OF THE RABBIT AT THE OTHER SIDE OF THE WORLD

We find in North America the common cottontail, the varying hare which turns white in winter, the white Arctic hare, the marsh-hare, and the larger jack-rabbit which inhabits the western plains. Some of these differ in different parts of the country.

Rabbits do much damage in Europe, but more in other parts of the world. A few taken to Australasia early last century multiplied so rapidly that they became the foremost peril to the continent's agriculture. They were trapped, poisoned, slain by scores of millions every year; but for long they sent land out of cultivation.

Happily, wire fencing, industry, and the demand for their meat and fur have lessened the evil, but still rabbits are as terrible to Australia and New Zealand as wolves once were to us.

Domestication has done wonders with the rabbit. We have lengthened its skull and its ears to bring about the lop and half-lop; we have developed the Angora into fleece-bearing beyond all hope; we have produced so homelike a type that it is named the Belgian hare; and have fixed breeds of chinchillas, silver-grays, and all manner of colors and sizes.

THE CHINESE EMPERORS AND THE SKIN OF THE SILVER-GRAY RABBIT

The old silver-gray breeds wild in burrows. For generations its skin was exported to China, where it rivaled the sea-otter in favor with the emperors.

And so with rodents as a whole. They were here before settlers, and they have withstood all assaults.

THE NEXT STORY OF ANIMAL LIFE IS ON PAGE 1259.

The Book of POETRY



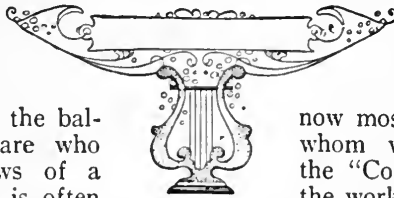
THE POETRY OF ACTION

SOME unknown but wise man is said to have believed that, "if a man were permitted to make all the ballads, he need not care who should make the laws of a nation." This saying is often quoted, as it deserves to be; for it is a testimony to the great power of poetry over the minds of men.

Heroism and patriotism are favorite subjects for the appeal of the poets, and very great results have been brought about by heroic and patriotic poems. It is true that once the people of a country have caught the inspiration of some patriotic song, that song will do far more to move them and quicken them to action than any law-making would do. What is now the national anthem of the French Republic, that grand song, set to inspiring music, *The Marseillaise*, was written by an army officer for the encouragement of the soldiers and the populace in the days of the French Revolution. The influence of that song on the destiny of France cannot be estimated, and it lives now, more than a century after the Revolution, as an everlasting call to war against tyranny and oppression, a song of freedom for all the world. Truly the power of poetry is greater than we might suspect.

At all times of public excitement poetry has played its part, and very poor poetry has often had great influence on the public.

Once in Great Britain a great reform



was influenced by popular songs. It was due largely to a group of poets, now mostly forgotten, chief of whom was Ebenezer Elliott, the "Corn Law rhymers," that the working people of England were roused against the old Corn Laws, which the Government was induced to abolish in the year 1846. Of course, many warlike poems have been written after the event, such as *The Charge of the Light Brigade* and *Paul Revere's Ride*. These are not less inspiring because they record history, for history is the source of all inspiration to noble effort; history and legend have supplied more themes to the poets than their own imagination could invent. Macaulay's *Lays of Ancient Rome* are among our finest heroic poems, and were written many centuries after the events they celebrate took place.

There is, indeed, an immense amount of verse that may be called "the poetry of action," in praise of heroism, self-sacrifice, patriotism. But it is easy to be led astray by the jingle of words if our mind is already disposed to a certain action and the words favor that. So that poetry may be as dangerous as it is powerful, and may mislead as well as lead. It is easy to sound the praises of our own land and the deeds of our own soldiers; it is more difficult to see the good in other lands and peoples. That we can best do in the quiet, thoughtful days of peace, as we shall see in our next lesson.



TRAVEL

I SHOULD like to rise and go
Where the golden apples grow:
Where, below another sky
Parrot islands anchored lie,
And, watched by cockatoos and
goats,
Lonely Crusoes building boats;
Where, in sunshine reaching out,
Eastern cities, miles about,
Are with mosque and minaret
Among sandy gardens set,
And the rich goods from near
and far
Hang for sale in the bazaar;
Where the Great Wall round China
goes,
And on one side the desert blows,
And with bell and voice and
drum,
Cities on the other hum;
Where are forests, hot as fire,
Wide as England, tall as a spire,
Full of apes and cocoa-nuts,
And the negro hunters' huts;

From The Complete Poems of Robert Louis Stevenson, copyright, 1905, 1923, by Charles Scribner's Sons.
By permission of the publishers.



Where the knotty crocodile
Lies and blinks in the Nile,
And the red flamingo flies
Hunting fish before his eyes;
Where in jungles near and far,
Man-devouring tigers are,
Lying close and giving ear
Lest the hunt be drawing near,
Or a comer-by be seen
Swinging in a palanquin;
Where, among the desert sands,
Some deserted city stands,
All its children—sweep and
prince—

Grown to manhood ages since,
Not a foot in street or house,
Not a stir of child or mouse,
And, when kindly falls the night,
In all the town no spark of light.
There I'll come when I'm a man
With a camel caravan;
Light a fire in the gloom
Of some dusty dining-room;
See the pictures on the walls—
Heroes, fights, and festivals;
And in a corner find the toys
Of the old Egyptian boys.

ROBERT LOUIS STEVENSON

FRANK C. RICE

THE LITTLE STAR

Jane Taylor was one of a family distinguished for their literary work in the first half of last century. With her sister Ann she wrote several books of simple hymns and verses which were great favorites in the young days of the older folk now living. The Little Star is one of the prettiest and simplest of Jane Taylor's poems for children.

TWINKLE, twinkle, little star;
How I wonder what you are!
Up above the world, so high,
Like a diamond in the sky.

When the blazing sun is gone,
When he nothing shines upon,
Then you show your little light,
Twinkle, twinkle, all the night.

Then the traveler in the dark,
Thanks you for your tiny spark;
He could not tell which way to go
If you did not twinkle so.



In the dark blue sky you keep,
And often through my curtains peep,
For you never shut your eye
Till the sun is in the sky.

As your bright and tiny spark
Lights the traveler in the dark,
Though I know not what you are,
Twinkle, twinkle, little star.

QUEEN MAB

Thomas Hood, who died in 1845, was a very gifted poet and brave man. He wrote several poems that will never be forgotten, and when battling with ill-health and disease he wrote many comic poems which have set everybody laughing who has read them, and will make many more laugh in the days to come. For he could be humorous as well as pathetic, and was very clever in his mixtures of grave and gay fancies. In Queen Mab he is neither, but just fanciful, which suits young folk best of all. Queen Mab reigns over the fairies.

A LITTLE fairy comes at night,
Her eyes are blue, her hair is brown,
With silver spots upon her wings,
And from the moon she flutters down.

She has a little silver wand,
And when a good child goes to bed
She waves her wand from right to left,
And makes a circle round its head.

And then it dreams of pleasant things,
Of fountains filled with fairy fish,
And trees that bear delicious fruit,
And bow their branches at a wish:

Of arbours filled with dainty scents
From lovely flowers that never fade;
Bright flies that glitter in the sun,
And glow-worms shining in the shade.

And singing birds with gifted tongues,
For singing songs and telling tales,
And pretty dwarfs to show the way
Through fairy hills and fairy dales.

But when a bad child goes to bed,
From left to right she weaves her rings,
And then it dreams all through the night
Of only ugly, horrid things!

Then wicked children wake and weep,
And wish the long black gloom away;
But good ones love the dark, and find
The night as pleasant as the day.

ABOU BEN ADHEM AND THE ANGEL

This famous poem by Leigh Hunt is not to be taken as teaching us that it is better to love our fellow-men than to love God. You might think that, at first reading. The real purpose of the poem is to teach us that while there are many people who are ready to proclaim that they love the Lord, not so many are ready to love their fellow-men. Yet God is best worshiped by our loving our fellow-men. The disciple John gave a new commandment, that ye love one another.

ABOU BEN ADHEM (may his tribe increase!)

Awoke one night from a deep dream of peace,
And saw, within the moonlight of the room,
Making it rich, and like a lily in bloom,
An angel writing in a book of gold;
Exceeding peace had made Ben Adhem bold,
And to the Presence in the room he said,
"What writest thou?" The vision raised his head,

And with a look made all of sweet accord,
Answer'd, "The names of those who love the Lord."

"And is mine one?" said Abou. "Nay, not so,"

Replied the angel. Abou spoke more low,
But cheerily still; and said, "I pray thee, then,

Write me as one who loves his fellow-men."

The angel wrote, and vanish'd. The next night

He came again with a great wakening light,
And show'd the names whom love of God had bless'd,

And lo! Ben Adhem's name led all the rest.

THE NORTH WIND

THE north wind doth blow,
And we shall have snow,
And what will poor Robin do then, poor thing?

He'll sit in a barn,
And keep himself warm,
And hide his head under his wing, poor thing.

MOTHER'S KISSES*

This pretty little poem was written by Lilla T. Elder.

"I'm writing to Mother," Alice said,
"And I'm making some kisses big and round!

She'll hold them close to her lips, like this,
And make a sweet little kissing-sound."

"Are kisses round?" little Mary asked,
"I'm sure they never feel so to me,
They feel like stars. Mother's do, I know,
And I'd draw them this way—star-shaped—see!"

"Like stars? Oh, Mary, how queer you are!
What funny thoughts you get in your head!"
"Alice, it's true! Don't you feel so, too,
When night-time comes and we're tucked in bed?"

"And Mother comes softly in—in the dark—
And we see a twinkle of something bright,
When she kisses us then; don't you feel as if
Her kisses were stars dropped out of the night?"

A TRAGIC STORY

Originally written in German, this little humorous poem was adapted into English verse by Thackeray, the great novelist.

THERE lived a sage in days of yore,
And he a handsome pigtail wore;
But wondered much, and sorrowed more
Because it hung behind him.

He mused upon this serious case,
And swore he'd change the pigtail's place
And have it hanging at his face,
Not dangling there behind him.

Says he, "The mystery I've found—
I'll turn me round"—he turned him round;
But still it hung behind him.

Then round and round, and out and in,
All day the puzzled sage did spin;
In vain—it mattered not a pin—
The pigtail hung behind him.

And though his efforts never slack,
And though he twist, and twirl, and tack,
Alas! still faithful to his back,
The pigtail hangs behind him.

I HEARD A SOLDIER†

This poem by Herbert Trench (1865-1923) carries us in mind to the sunny place where lay the soldier dreaming of the future and the meeting with one whom he had loved.

I HEARD a soldier sing some trifle
Out in the sun-dried veldt alone:
He lay and cleaned his grimy rifle
Idly, behind a stone.

"If after death, love, comes a waking,
And in their camp so dark and still
The men of dust hear bugles, breaking
Their halt upon the hill,

"To me the slow and silver pealing
That then the last high trumpet pours
Shall softer than the dawn come stealing,
For, with its call, comes yours!"

What grief of love had he to stifle,
Basking so idly by his stone,
That grimy soldier with his rifle
Out in the veldt, alone?

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THE LION AND THE MOUSE

The interesting story of the lion and the mouse is perhaps one of the best known of Æsop's Fables. But although we may have read it before, it is well worth reading again, and here it is put into verse, for young readers, by Jeffreys Taylor.

A LION with the heat oppress'd,
One day composed himself to rest:
But whilst he dozed as he intended,
A mouse his royal back ascended;
Nor thought of harm, as Æsop tells,
Mistaking him for someone else;
And travell'd over him, and round him,
And might have left him as she found him
Had she not—tremble when you hear—
Tried to explore the monarch's ear!
Who straightway woke, with wrath im-
mense,

And shook his head to cast her thence.
"You rascal, what are you about?"
Said he, when he had turned her out.
"I'll teach you soon," the lion said,
"To make a mouse-hole in my head!"

So saying, he prepared his foot
To crush the trembling tiny brute;
But she (the mouse) with tearful eye,
Implored the lion's clemency,
Who thought it best at last to give
His little pris'ner a reprieve.

'Twas nearly twelve months after this,
The lion chanced his way to miss;
When pressing forward, heedless yet,
He got entangled in a net.
With dreadful rage, he stamped and tore,
And straight commenced a lordly roar;
When the poor mouse, who heard the noise,
Attended, for she knew his voice.
Then what the lion's utmost strength
Could not effect, she did at length;
With patient labour she applied
Her teeth, the network to divide;
And so at last forth issued he,
A lion, by a mouse set free.

Few are so small or weak, I guess,
But may assist us in distress,
Nor shall we ever, if we're wise,
The meanest or the least despise.

THE TIGER

The author of this fine poem, William Blake, was a man of strange thoughts. Here he expresses the great wonder of nature: that God who made the gentle lamb made also the awful tiger of the jungle, with eyes of fire, and all the terrible power of limb and body. In another place we read his beautiful poem addressed to the gentle and playful lamb.

TIGER, tiger, burning bright
In the forest of the night,
What immortal hand or eye
Could frame thy fearful symmetry?
In what distant deeps or skies
Burnt the ardour of thine eyes?
On what wings dare he aspire—
What the hand dare seize the fire?
And what shoulder, and what art
Could twist the sinews of thy heart?
And when thy heart began to beat,
What dread hand form'd thy dread feet?
When the stars threw down their spears,
And watered heaven with their tears,
Did He smile his work to see?
Did He who made the lamb make thee?

BATTLE OF THE BALTIC

The battle of the Baltic was fought in April, 1801, and the heroism of Nelson was the great feature of this famous sea-fight. Sir Hyde Parker commanded the English fleet, and Captain Edward Riou was killed while in command of a squadron. This stirring poem was written by Thomas Campbell.

OF Nelson and the North
Sing the glorious day's renown.
When to battle fierce came forth
All the might of Denmark's crown,
And her arms along the deep proudly
shone:
By each gun the lighted brand
In a bold determined hand,
And the Prince of all the land
Led them on.

Like leviathans afloat
Lay their bulwarks on the brine;
While the sign of battle flew
On the lofty British line:
It was ten of April morn by the chime:
As they drifted on their path
There was silence deep as death;
And the boldest held his breath
For a time.

But the might of England flush'd
To anticipate the scene;
And her van the fleetest rush'd
O'er the deadly space between.
"Hearts of oak!" our captains cried,
when each gun
From its adamant lips
Spread a death-shade round the ships,
Like the hurricane eclipse
Of the sun.

Again! again! again!
And the havoc did not slack,
Till a feeble cheer the Dane
To our cheering sent us back:—
Their shots along the deep slowly boom:
Then ceased—and all is wail
As they strike the shatter'd sail;
Or in conflagration pale
Light the gloom.

Out spoke the victor then .
As he hail'd them o'er the wave,
"Ye are brothers! ye are men!
And we conquer but to save:
So peace instead of death let us bring:
But yield, proud foe, thy fleet
With the crews, at England's feet,
And make submission meet
To our King."

Then Denmark blest our chief
That he gave her wounds repose;
And the sounds of joy and grief
From her people wildly rose.
As death withdrew his shades from the day:
While the sun look'd smiling bright
O'er a wide and woeful sight,
Where the fires of funeral light
Died away.

Now joy, old England, raise!
For the tidings of thy might,
By the festal cities' blaze.
Whilst the wine-cup shines in light;

And yet, amidst that joy and uproar,
Let us think of them that sleep
Full many a fathom deep
By thy wild and stormy steep,
Elsinore!

Brave hearts! to Britain's pride
Once so faithful and so true,
On the deck of fame that died
With the gallant good Riou:
Soft sigh the winds of heaven o'er their grave!
While the billow mournful rolls,
And the mermaid's song concedes,
Singing, Glory to the souls
Of the brave!

LUCY GRAY

In this well-known ballad by William Wordsworth the awful sense of solitude and the terror of the dark days of winter: on the lonely moors are suggested with the most dramatic effect, although it is written in a simple and direct manner.

OF I had heard of Lucy Gray:
And, when I cross'd the wild,
I chanced to see at break of day
The solitary child.

No mate, no comrade Lucy knew;
She dwelt on a wide moor,
The sweetest thing that ever grew
Beside a human door!

You yet may spy the fawn at play,
The hare upon the green;
But the sweet face of Lucy Gray
Will never more be seen.

"To-night will be a stormy night—
You to the town must go;
And take a lantern. Child, to light
Your mother through the snow."

"That, Father, will I gladly do:
'Tis scarcely afternoon—
The minster-clock has just struck two,
And yonder is the moon!"

At this the father raised his hook,
And snapp'd a faggot brand;
He plied his work:—and Lucy took
The lantern in her hand.

Not blither is the mountain roe:
With many a wanton stroke
Her feet disperse the powdery snow,
That rises up like smoke.

The storm came on before its time:
She wander'd up and down;
And many a hill did Lucy climb:
But never reach'd the town.

The wretched parents all that night
Went shouting far and wide:
But there was neither sound nor sight
To serve them for a guide.

At daybreak on a hill they stood
That overlook'd the moor;
And thence they saw the bridge of wood,
A furlong from their door.

They wept—and, turning homeward, cried:
"In heaven we all shall meet!"
When in the snow the mother spied
The print of Lucy's feet.

Then downwards from the steep hill's
edge
They track'd the footmarks small;
And through the broken hawthorn hedge,
And by the long stone wall:

And then an open field they cross'd:
The marks were still the same;
They track'd them on, nor ever lost;
And to the bridge they came.

They follow'd from the snowy bank
Those footmarks, one by one,
Into the middle of the plank;
And further there were none!

Yet some maintain that to this day
She is a living child;
That you may see sweet Lucy Gray
Upon the lonesome wild.

O'er rough and smooth she trips along,
And never looks behind;
And sings a solitary song
That whistles in the wind.

WHEN I HAVE FEARS

This sonnet by John Keats is one of the saddest in all our literature. Keats was ill, and felt he might not recover. He feared that life was slipping from him with his dreams of fame and love unrealized.

WHEN I have fears that I may cease to be
Before my pen has gleaned my teeming
brain,

Before high-piled books, in character,
Hold like rich garners the full-ripened grain;
When I behold, upon the night's starred face,
Huge cloudy symbols of a high romance,
And think that I may never live to trace
Their shadows, with the magic hand of
chance;

And when I feel, fair creature of an hour,
That I shall never look upon thee more,
Never have relish in the faery power
Of unreflecting love—then on the shore
Of the wide world I stand alone, and think
Till love and fame to nothingness do sink.

SNOW-FLAKES

Henry Wadsworth Longfellow has written many beautiful poems, but none with a lighter touch than Snow-flakes. It makes us imagine that we actually feel the snow falling.

OUT of the bosom of the air,
Out of the cloud-folds of her garments
shaken,

Over the woodlands brown and bare,
Over the harvest fields forsaken
Silent and soft and slow,
Descends the snow.

Even as our cloudy fancies take
Suddenly shape in some divine expression,
Even as the troubled heart doth make
In the white countenance confession,
The troubled sky reveals
The grief it feels.

This is the poem of the air,
Slowly in silent syllables recorded;
This is the secret of despair,
Long in its cloudy bosom hoarded,
Now whispered and revealed
To wood and field.

GOD MOVES IN A MYSTERIOUS WAY

William Cowper wrote this beautiful hymn, which is sung in many churches. His wonderful genius speaks to us through this poem as through a number of his other works.

GOD moves in a mysterious way
His wonders to perform;
He plants His footsteps in the sea,
And rides upon the storm.
Deep in unfathomable mines
Of never-failing skill
He treasures up His bright designs,
And works His sovereign will.
Ye fearful saints, fresh courage take!
The clouds ye so much dread
Are big with mercy, and shall break
In blessings on your head.
Judge not the Lord by feeble sense,
But trust Him for His grace;
Behind a frowning providence
He hides a smiling face.
His purposes will ripen fast,
Unfolding every hour;
The bud may have a bitter taste,
But sweet will be the flower.
Blind unbelief is sure to err,
And scan His work in vain;
God is His own interpreter,
And He will make it plain.

ELEGY ON THE DEATH OF A MAD DOG

This amusing poem, by Oliver Goldsmith, is one of several that occur in the course of his famous story *The Vicar of Wakefield*, and it serves to remind us that it is not always what we think is most likely to happen that comes to pass.

GOOD people all, of every sort,
Give ear unto my song;
And if you find it wondrous short
It cannot hold you long.
In Islington there was a Man,
Of whom the world might say,
That still a godly race he ran—
Whene'er he went to pray.
A kind and gentle heart he had,
To comfort friends and foes;
The naked every day he clad—
When he put on his clothes.
And in that town a Dog was found,
As many dogs there be,
Both mongrel, puppy, whelp, and hound,
And curs of low degree.
This Dog and Man at first were friends;
But when a pique began,
The Dog, to gain some private ends,
Went mad, and bit the Man.
Around from all the neighbouring streets
The wondering neighbours ran,
And swore the Dog had lost his wits,
To bite so good a Man!
The wound it seem'd both sore and sad
To every Christian eye;
And while they swore the Dog was mad,
They swore the Man would die.
But soon a wonder came to light,
That shew'd the rogues they lied:—
The Man recover'd of the bite,
The Dog it was that died!

ON THE DEATH OF JOSEPH RODMAN DRAKE

We have Drake's two best poems in our book: The Culprit Fay and The American Flag, and so we know something of his poetry. This poem by his friend, Fitz-Greene Halleck, tells us something of the man. Halleck was of Puritan descent. He became friends with Drake in New York, and they published The Croakers together in the Evening Post. You will find Halleck's best known poem, Marco Bozzaris, on page 2765.

GREEN be the turf above thee,
Friend of my better days!
None knew thee but to love thee,
Nor named thee but to praise.

Tears fell, when thou wert dying,
From eyes unused to weep,
And long where thou art lying,
Will tears the cold turf steep.

When hearts, whose truth was proven,
Like thine, are laid in earth,
There should a wreath be woven
To tell the world their worth;

And I, who woke each morrow
To clasp thy hand in mine,
Who shared thy joy and sorrow,
Whose weal and woe were thine:

It should be mine to braid it
Around thy faded brow,
But I've in vain essayed it,
And feel I cannot now.

While memory bids me weep thee,
Nor thoughts nor words are free,
The grief is fixed too deeply
That mourns a man like thee.

LINES TO AN INDIAN AIR

Singularly musical are these three stanzas by Percy Bysshe Shelley, supplying their own melody without the necessity for an Indian air. The first stanza moves slowly as a person awaking from deep slumber might move; the second stirs us with its increasing feeling; the third is eloquent of the ecstasy and spensiveness of great passion.

IARISE from dreams of thee
In the first sweet sleep of night,
When the winds are breathing low,
And the stars are shining bright.
I arise from dreams of thee,
And a spirit in my feet
Has led me—who knows how?
To thy chamber window, sweet!

The wandering airs they faint
On the dark, the silent stream;
The champak odors fail
Like sweet thoughts in a dream;
The nightingale's complaint,
It dies upon her heart,
As I must die on thine,
O beloved as thou art!

O lift me from the grass!
I die, I faint, I fail!
Let thy love in kisses rain
On my lips and eyelids pale.
My cheek is cold and white, alas!
My heart beats loud and fast:
Oh! press it close to thine again,
Where it must break at last.

INVICTUS

The Latin name of this poem by William Ernest Henley means "unconquerable." Besides being a poet, Henley was a critic and an editor, and the friend of Stevenson, who went to visit him in the hospital in Edinburgh, where Henley wrote his Hospital Sketches.

OUT of the night that covers me,
Black as the pit from pole to pole,
I thank whatever gods may be
For my unconquerable soul.
In the fell clutch of circumstance
I have not winced nor cried aloud.
Under the bludgeonings of chance
My head is bloody, but unbowed.
Beyond this place of wrath and tears
Looms but the Horror of the shade,
And yet the menace of the years
Finds and shall find me unafraid.
It matters not how strait the gate,
How charged with punishments the scroll,
I am the master of my fate:
I am the captain of my soul.

THE DOVE

Those of us who read the first line of this poem will find it hard to forget. Simple in expression, it seems as though we ourselves could often apply it to different things that we have loved and lost. The poem is by John Keats.

I HAD a dove, and the sweet dove died;
And I have thought it died of grieving;
O, what could it grieve for? Its feet were tied
With a silken thread of my own hand's
weaving;
Sweet little red feet! why should you die—
Why would you leave me, sweet bird! why?
You lived alone in the forest tree,
Why, pretty thing! would you not live with
me?
I kissed you oft and gave you white peas;
Why not live sweetly, as in the green trees?

THE SKYLARK

So many of the poets have written verses on the skylark that it is interesting to compare their different treatment. Generally, the song of the bird is celebrated, and this poem by James Hogg makes no exception; yet the metre pictures vividly the springing bounds of its flight.

BIRD of the wilderness,
Blithesome and cumberless,
Sweet be thy matin o'er moorland and lea!
Emblem of happiness,
Blest is thy dwelling-place—
O to abide in the desert with thee!
Wild is thy lay and loud,
Far in the downy cloud,
Love gives it energy, love gave it birth.
Where, on thy dewy wing,
Where art thou journeying?
Thy lay is in heaven, thy love is on earth.
O'er fell and fountain sheen,
O'er moor and mountain green,
O'er the red streamer that heralds the day,
Over the cloudlet dim,
Over the rainbow's rim,
Musical cherub, soar, singing, away!
Then, when the gloaming comes,
Low in the heather blooms
Sweet will thy welcome and bed of love be!
Emblem of happiness,
Blest is thy dwelling-place—
O to abide in the desert with thee!

BLESS you, bless you, bonnie bee!
 Say, when will my wedding be?
 If it be to-morrow day,
 Take your wings and fly away.
 Fly away east, or fly away west,
 And show me where *he* lives who loves
 me the best!



BABY and I
 Were baked in a pie,
 The gravy was wonderful hot!
 We had nothing to pay
 To the baker that day,
 And so we crept out of the pot.

"HOW many miles to Babylon?"
 "Three score miles and ten."
 "Can I get there by candle-light?"
 "Yes, and back again;
 If your heels are nimble and light
 You may get there by candle-light."

BRIAN O'LIN had no breeches to
 wear,
 So he bought him a sheepskin and
 made him a pair
 With the skinny side out, and the
 woolly side in,
 "Ah, ha, that is warm!" said Brian
 O'Lin.

Brian O'Lin and his wife and wife's
 mother,
 They all went over a bridge together;
 The bridge was broken and they all
 fell in,
 "Mischievous take all!" quoth Brian O'Lin.

UP hill and down dale;
 Butter is made in every vale;
 And if that Nancy Cook
 Is a very good girl,
 She shall have a spouse,
 And make butter anon,
 Before her old grandmother
 Grows a young man.

WASH me and comb me,
 And lay me down softly,
 And lay me on a bank to dry,
 That I may look pretty,
 When somebody comes by.

"OLD woman, old woman, shall we
 go a-shearing?"
 "Speak a little louder, sir, I'm very
 thick of hearing."
 "Old woman, old woman, shall I kiss
 you dearly?"
 "Thank you, kind sir, I hear you very
 clearly."

"LITTLE maid, pretty maid, whither
 goest thou?"
 "Down in the forest to milk my cow."
 "Shall I go with thee?" "No, not
 now;
 When I send for thee, then come
 thou."

SLEEP, baby, sleep,
 Our cottage vale is deep;
 The little lamb is on the green,
 With woolly fleece so soft and clean—
 Sleep, baby, sleep!

Sleep, baby, sleep,
 Down where the woodbines creep;
 Be always like the lamb so mild,
 A kind, and sweet, and gentle child—
 Sleep, baby, sleep!



DRIBBLE, dribble, trickle, trickle,
 What a lot of rawdust!
 My dolly's had an accident,
 And has lost a lot of sawdust!

THE cuckoo's a bonny bird,
 She sings as she flies;
 She brings us good tidings,
 And tells us no lies.
 She sucks little birds' eggs,
 To make her voice clear,
 And never cries Cuckoo
 Till spring-time of the year.

RHYMES AND JINGLES OF MARY MAPES DODGE*

We have already read in the Book of Poetry several poems specially written for young folk by the late Mary Mapes Dodge, who used to edit the children's magazine St. Nicholas. On this page we have gathered together a collection of her little verses, which are nursery rhymes rather than poems.

BILLY BOY

POOOR Billy boy was music mad,
On music mad was he,
And yet he was as blithe a lad
As any lad could be.
With a "hi-de-diddle,
Bow and fiddle,
Rig-a-my, ho!" sang he—
For Billy was as blithe a lad
As any lad could be.
"Nobody knows the joys I know,
Or sees the sights I see,
So play me high, or play me low,
My fiddle's enough for me.
It takes me here, it takes me there—
So play me low or high—
It finds me, binds me anywhere,
And lifts me to the sky."
With a "hi-de-diddle,
Bow and fiddle,
Rig-a-my, ho!" sang he—
For Billy was as blithe a lad
As any lad could be.

THE GOOD LITTLE GIRLS

OH, where are all the good little girls?
Where are they all to-day?
And where are all the good little boys?
Tell me, somebody, pray.
Safe in their fathers' and mothers' hearts,
The girls are stowed away;
And where the girls are, look for the
boys—
Or so I've heard folk say.

LITTLE WHITE FEATHERS

LITTLE white feathers,
Filling the air—
Little white feathers,
How came ye there?
"We came from the cloud-birds
Sailing so high,
They're shaking their white wings
Up in the sky."
Little white feathers,
How swift you go!
Little white snowflakes,
I love you so!
"We are swift because
We have work to do;
But hold up your face,
And we'll kiss you true."

ONE AND ONE

TWO little girls are better than one;
Two little boys can double the fun;
Two little birds can build a fine nest;
Two little arms can love mother best;
Two little ponies must go to a span;
Two little pockets has my little man;
Two little eyes to open and close,
Two little ears and one little nose,
Two little elbows, dimpled and sweet,
Two little shoes on two little feet,
Two little lips and one little chin,
Two little cheeks with a rose shut in,
Two little shoulders, chubby and strong,
Two little legs running all day long.
Two little prayers does my darling say,
Twice does he kneel by my side each day,
Two little folded hands, soft and brown,
Two little eyelids cast meekly down,
And two little angels guard him in bed,
One at the foot, and one at the head.

THE THREE OLD LADIES

THERE was an old lady all dressed
in silk,
Who lived upon lemons and buttermilk;
And, thinking this world was a sour old
place,
She carried its acid all over her face.
Another old lady, all dressed in patches,
Lived upon nothing but lucifer matches;
So the world, it made her strangle and
cough,
And sure as you rubbed her you set her
off.
Another old lady, all sunny and neat,
Who lived upon sugar, and everything
sweet,
Exclaimed, when she heard of their
troubles, "I never!
For the world is so nice I could live on
for ever!"
Now, children, take your choice
Of the foods your heart shall eat;
There are sourish thoughts, and brim-
stone thoughts,
And thoughts all good and sweet.
And whatever the heart feeds on,
Dear children, trust to me,
Is precisely what this queer old world
Will seem to you to be.

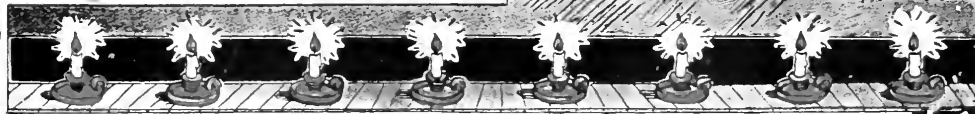
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LITTLE VERSES FOR VERY LITTLE PEOPLE

THERE WAS AN
OLD WOMAN
WHO LIVED
IN A SHOE



SHE HAD SO MANY CHILDREN
SHE DIDN'T KNOW WHAT TO DO;
SHE GAVE THEM SOME BROTH
WITHOUT ANY BREAD,
SHE WHIPPED THEM ALL SOUNDLY,
AND SENT THEM TO BED . . .



LITTLE VERSES FOR VERY LITTLE PEOPLE

There was an old woman, as I've heard tell,
She went to the market her eggs to sell;
She went to the market all on a market day,
And she fell asleep on the king's high-way.

There came by a pedlar, whose name was Stout,
He cut her petticoats all round about:
He cut her petticoats up to the knees,
Which made the old woman to shiver and freeze.

When the little woman first did wake,
She began to shiver and she began to shake,
She began to wonder and she began to cry:
"Oh, deary, deary me, this is none of I!"

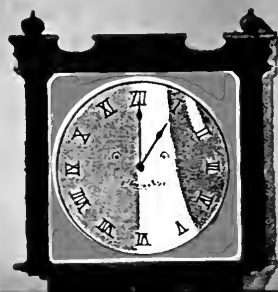
"But if it be I, as I do hope it be,
I've a little dog at home and he'll know me;
If it be I, he'll wag his little tail,
And if it be not I, he'll loudly bark and wail."

Home went the little woman all in the dark,
Up got the little dog, and he began to bark;
He began to bark, so she began to cry:
"Oh, deary, deary me, this is none of I!"

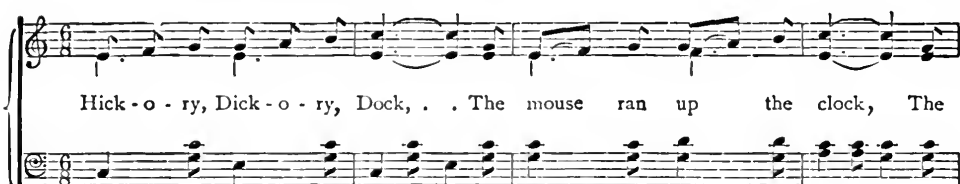


S.C. Burnside

Hickory,
Dickory,
Dock.



HICKORY, DICKORY, DOCK



O, all you little Blackie-tops

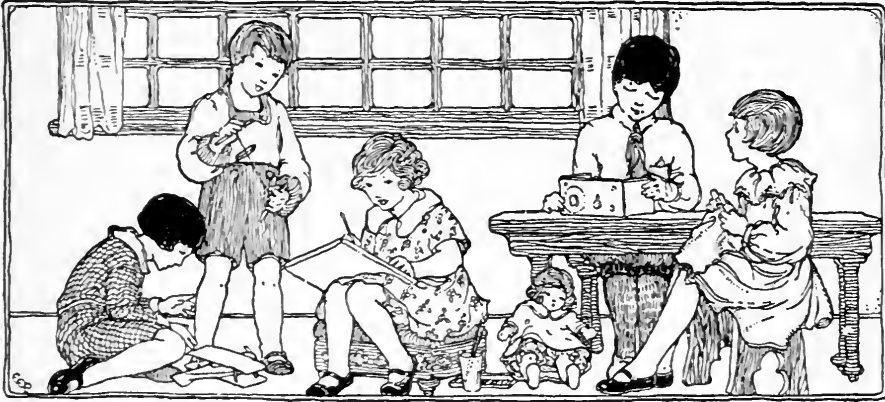


O, all you little Blackie-tops,
Pray do not eat my Father's crops
While I lie down to take a nap.
Shua O! Shua O!

If Father he perchance should come
With his cocked hat and his long gun,
Then you must fly, and I must run.
Shua O! Shua O!



THINGS TO MAKE AND THINGS TO DO



HOW TO MAKE A HANDY MARBLE BAG

ON one of the very first warm days after the snow leaves the ground and other signs of spring appear, many boys are found looking for their last year's marbles or buying new ones. Then as soon as they have the marbles in their possession they wish they had marble bags in which to keep them. Some boys ask their sisters or mothers to help them out, while others have been known to make their own bags. Of course, every boy knows just how important the playing of marbles has become in the past few years, as in many cities there have been contests, and champions were chosen. Perhaps you have known or even been one of these lucky boys. If not, you may be in training with some of your friends in the neighborhood practicing for some marble contest.

One of the simplest marble bags to make is constructed from an oblong piece of heavy canvas or other material which is about 12 inches long and 5 inches wide. Tan is a good color to use, as it does not show the dirt readily. Quite heavy material should be selected if it is to serve its owner for any length of time, as such a bag usually has hard usage, especially when in the hands of a marble enthusiast.

After choosing the piece of canvas or other suitable material, first, fold it in the middle so that when doubled it will form a bag about 6 inches deep and 5 inches wide. Then take a coarse needle and sew up the two side seams with strong linen thread. These seams should

be made very strong. Do not sew too near to the edges but plan to make the seams about $\frac{1}{4}$ inch back from the edges. Now it is well to rub your thumb nail along the seams where the material is joined so that one raw edge shall be folded toward each side.

Next, prepare for a hem at the top by first folding the cloth over about $\frac{1}{4}$ inch and then by folding it again about 1 inch more. In sewing this hem care should be taken to leave a small space unsewed on each side where it crosses the seam, in order that the draw string may be run into the hem to close the marbles in the bag. The bag is now ready to be turned

so that it will be right side out. By taking a piece of heavy cord about 12 inches long you may easily run it into the hem and tie the ends together so that it cannot pull out. The marble bag is now completed and all ready for your marbles. If a girl wishes to delight her young brother also, she should make him a bag.



The marble bag completed.

MAKING A DOLL'S HOUSE

MOST boys have sisters, and if they have not, they are pretty sure to have girl cousins who would be glad to have a doll's house. And a doll's house is by no means a difficult or an expensive thing to make.

The first thing we want is a box from which to make our doll's house, and we may be successful in finding the nearest grocer willing to let us have an empty box that would suit. Some boxes, such as grocers have, are very suitable indeed. A packing-box, for instance, is just about the right size, the wood is nice and thin, so that it is not difficult to work, and one side of it hinges with a wire hinge, which will enable one side of our doll's house to open and close so that its proud owner may arrange the furniture in the rooms we are about to make. We can explain what we want to the grocer, and he will give us the nearest box he can to suit our purpose.

Picture 1 shows the house we are about to make when it has been finished and furnished.

We shall suppose that we have got two empty boxes, and shall see how we can adapt them to make a good doll's house. One of the boxes will serve as the frame of the house, and the other we shall cut up to make partitions and floors. Upon the bottom of one box, outside, we make a drawing something like picture 2, which shows a hall door in the centre of the ground floor of our house, with a large window at each side, and up near the top we have three windows which will be on the upper floor when the house is finished. We can cut out the windows and the door, leaving the window-sills and door-posts drawn upon the wood.

Upon the back of the house, which is the lid of the box upon which we are working, we make the drawing of picture 3, but in this case we had better not cut out the windows and door, because this would weaken the back wall too much, and we wish to keep it strong so that it may open and close without breaking. But on each side of the house we make a drawing like picture 4, and in this case we cut out the windows, as we did in making

the front wall.

We now attend to the inside of the house, and for the partitions and floors we cut up the second box that we were lucky enough to get. If the second box is the same size as the first box, we take out one end carefully and it

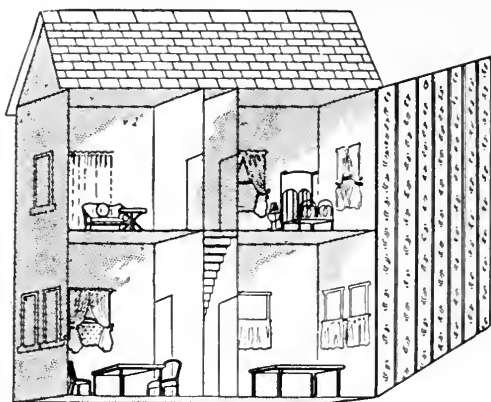
will do for a floor which we put across rather more than halfway up the height of our house. We shall thus give the ground-floor rooms roofs a little higher than the upstairs rooms. We had better not nail the floor into position yet, because, before we do so, we must cut a hole for the stairway, and we are not ready for that yet. But with books or something else we can prop up the floor temporarily, taking care that we have it level.

Now measure the distance from front to back in the ground floor, and the height from the floor to the roof. Make two partitions to go in, as shown in picture 5, and make two similar partitions for the upper floor. It will be seen that the lobby goes right from the front door to the back of the house. The upstairs lobby has a window at each end. The doors should be cut in the partitions as shown, but in one partition we make two doors—one at each end of the partition. We shall see why, presently.

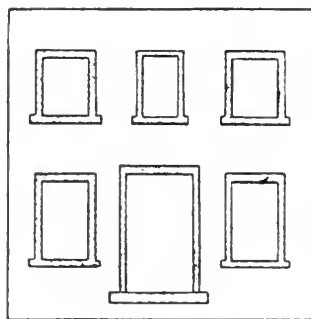
When all these pieces are ready, but not nailed into their places, we can make the stairs lead from the ground floor to the upper floor. About the best thing to use for the stairs is an empty cigar box, if we can get one. Tobacconists usually have plenty, and we should be able to get one without difficulty.

We cut the lid of the cigar box to the shape seen in picture 6, making the total height the same as the height of the ground floor, so that

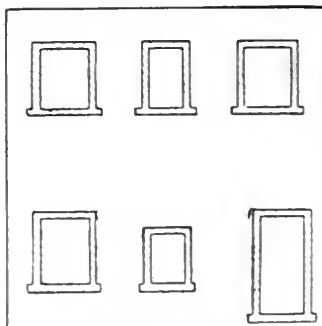
the top of the stairs will be level with the upper floor. Then we cut the bottom of the cigar box exactly in the same way, and that gives us two sides for our stairs. We glue one of the pieces to one partition and the other piece to another partition, keeping the front of the stairs clear of the doors of the two partitions. Now we cut short pieces from the remaining wood of the cigar box to make steps to go right across the lobby—making front pieces, or *risers*, as they are called, as well as top pieces, or *treads*. The part of the lobby under the stairs will make a scullery or closet, which has a door leading from the kitchen. We now see why one partition has two doors; one of the doors leads from the lobby into the kitchen and the other from the kitchen into the scullery. We now cut a hole of suitable size in the upstairs floor to take the top of the stairs. We are now ready to nail the floor into position, and we do so



1. The doll's house completed and furnished.

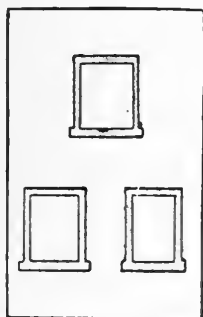


2. Front of the doll's house.



3. Back of the doll's house.

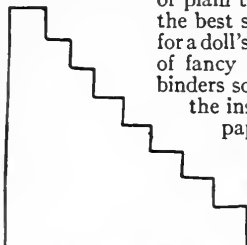
LITTLE PROBLEMS FOR CLEVER PEOPLE



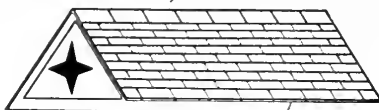
4. The side of the house.

by driving thin wire nails through the side walls and front of the house, being very careful to get them straight into the floor. Similarly we nail the partitions into place. The positions of the partitions and stairs will then be right.

We shall provide our doll's house with a sloping roof, and, taking our sizes from the present flat roof, we make and erect upon the latter a sloping roof, as shown in picture 7. It consists of two large sloping sides and two end pieces of triangular shape. The sloping side that goes down over the front wall may be made so that it sticks out quite a little beyond the front of the wall, which will give us eaves projecting in front of the house. We must, however, have the back roof shorter than the front, because the hinged back wall will not allow us to have eaves at the back of the house. When we have made this roof we nail it to the flat roof of the house, being careful that the back edge does not prevent the back wall of the house from hinging open. With a little care a neat job can be made of this part of our house. We must be sure that there is not a noticeable space between the roof edge and the wall.



6. The side of the stairs.

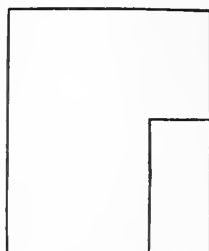


7. The roof of the house.

The structure of the house is completed, but we have still something to do in the way of interior decoration. We can paper the walls of the different rooms with wallpaper. We can use ordinary wallpaper with a very small pattern, or plain tinted paper; but the best sort of wallpaper for a doll's house is the sort of fancy paper the book-binders sometimes use for the inside covers and fly-leaves of books. This paper is sold by many stationers.

We can fit small panes of glass into the window-spaces that we cut out, and we can even drape the windows with curtains. If we put in glass windows we shall require eleven pieces of glass, which should be a little longer and a little wider than the eleven window-spaces that we have cut out. The simplest way to fix them will be to put in two sharp tacks just below each window so that the glass may rest upon them, and two tacks at the top to keep the glass from falling into the rooms. The doors of the various rooms can be provided with hinges by using cloth or thin leather, glued into place.

A chimney can be made for the roof, and the outside can be painted, say, slate color for the roof, and red with black lines on the walls to imitate bricks. Then the house is ready to be furnished with furniture which will be suitable and comfortable for the doll residents.



5. The partition.

LITTLE PROBLEMS FOR CLEVER PEOPLE

THESE problems are continued from page 899, and the answers are given on page 1286.

HOW MUCH FOR A HORSE AND A COW?

1. "I have sold 9 horses and 7 cows for \$1,500," said Farmer Giles. "I suppose you got more for each horse than you did for each cow?" asked his friend. "Yes, I got double," replied the farmer.

What was the price of the animals?

WHO WAS RIGHT?

2. "There is only one more wicket to fall," said a boy who was watching a cricket match, as the ninth man was going in. "No," said another boy, "there are two." "You are both wrong," said a third boy; "there are three."

Which of the three boys was correct?

In cricket, the national summer game of England, there are eleven players on a team. When ten players are put out, that is, when ten wickets "fall," a side is out. There are two wickets on the cricket field and two batsmen are in at the same time. For example, players 1 and 2 are at the wickets. Player 1 is put out and Player 3 goes in. But only one wicket has fallen.

WHAT WAS ITS PRICE?

3. "During sale week," said the merchant to a customer, "we will allow 20 per cent off the prices marked on the goods, but next week, after the sale is over, we will allow only 5 per cent discount." After the sale was over the lady bought something, and paid for it \$3 more than it would have cost during the sale.

What was the marked price?

HOW MUCH DID THE GROCER LOSE?

4. Said the grocer, "One of my customers has failed, and I have lost a good customer. I used to sell him tea at 60 per cent profit on cost price. He is going to pay 62½ cents on the dollar."

How much did the grocer lose?

WHAT WAS THE PRICE OF BACON?

5. "Take this piece of bacon and 50 eggs for \$1.60," said the provision dealer. "I have only 80 cents," said the boy. "Well, take half of the bacon and 25 eggs," replied the man. "No," said the boy, "I will take the whole of the bacon and 10 eggs." The provision dealer agreed to this arrangement.

What was the price of the bacon?

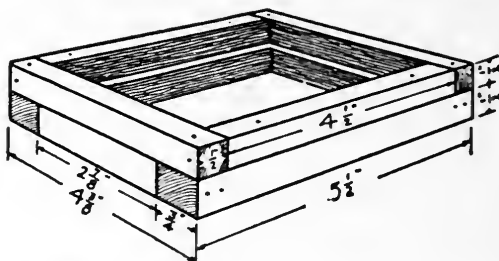
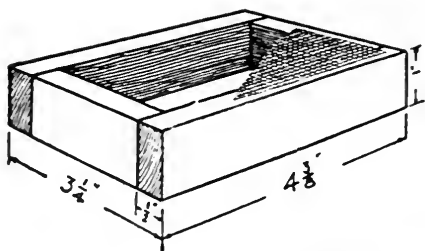
HOW TO MAKE YOUR OWN PAPER

DO you wish to know how you may make paper by hand? If you do, these directions will explain just how it is done. First, secure old linen rags and shred or tear them into fine pieces (about $\frac{1}{2}$ inch squares or even smaller). Next, boil them in a solution made of caustic potash or caustic soda dissolved in a few quarts of water. The small pieces of cloth are carefully stirred into this. The caustic potash or soda solution containing the rags is boiled for several (3 or more) hours to remove the impurities. The rags are washed thoroughly in clear water and poured into a colander. Be careful to wring the rags each time. Now dry the rags by spreading them out upon boards where they may better come in contact with the air.

When dry, put the rags through mother's food-

on the screen should be turned into a shallow dish, in which a piece of cheesecloth has first been placed to prevent the pulp from sticking to the dish. By covering this first layer of pulp with a small piece of cheesecloth a second layer of pulp may be deposited and covered with cheesecloth, etc., until the desired number of sheets has been provided. Some pressure should now be used to force these sheets of pulp together. A clothes-wringer may be used for single pulp sheets if properly covered with cloth.

This may be done to the pile of pulp sheets by placing it in some kind of press. If you have not access to a press, the pressure may be applied by means of clamps or by the use of weights, such as bars of iron or heavy stones. The water may be



Working drawings of mold and deckle.

chopper to make them into a fine pulp. If tinted paper is desired, bluing, ink or other colorings may be used. In any case, the pulp is placed in water to which starch is added until the mixture is about the consistency of gravy. You may now agitate the wash by stirring with a paddle or stick, and while the pulp is evenly distributed in the water, dip in the mold, which is a screen the size of the desired sheet of paper. (This mold is made by stretching a fine-mesh wire fly-screen, copper or brass if possible, over a small wooden frame, as shown.) It is better to make a mold and deckle, as suggested in the drawings, as the frame or so-called deckle fits over the mold to keep the pulp from washing off of the edges.

When the screen is shaken and lifted out, the liquid will be allowed to drain back into the tank. The thin layer of pulp which has been deposited

caught in a pail as it is squeezed out, or this whole process may be carried on out of doors.

The sheets of paper are now removed, each on its piece of cloth, and are placed in a row to dry. It is quicker to iron these dry with a warm iron, although this is not at all necessary. By making the mold and deckle the proper size, it is possible to make attractive Easter and Christmas cards from the paper thus made. Of course such cards would need to be suitably decorated and lettered. You will be able to combine the linoleum block printing explained on page 617 in Volume Two in making appropriate designs on these "deckle-edged" sheets or cards. It is interesting to note that this same knowledge of paper-making was not possessed by the Europeans until the Mohammedans entered Spain and made the art known to them.

HOW TO TELL THE WEATHER

IT is always useful to be able to tell the weather; that is, to judge by the condition of the sky and the atmosphere, and so on, what the weather is likely to be in the next twenty-four hours. Of course a great deal depends upon the locality, for conditions that mean wind coming in one place may mean rain in another. But there are general principles that are worth remembering, and will help us in our study of the weather.

If at sunset the sky appears red, fine weather may be looked for on the coming day; but if the sky is red in the morning there will probably be wind or rain. A yellow sky in the evening generally means a wet day to follow, and if the sun sets in a dense bank of clouds, rain may also be looked for. If the morning is hazy, and the sun is seen through a mist while the sky appears blue, the day will most likely be warm.

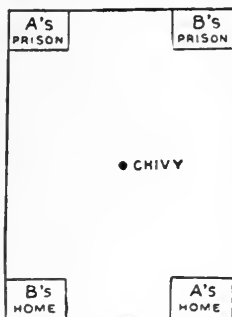
If the early morning is cloudy, but as time goes on the clouds begin to disperse, a fine day is to be anticipated. When the stars seem particularly bright at night, and twinkle more plainly than usual, a wet day usually follows. We may often get a good idea of the weather that is likely to be experienced by watching animals. Cats often rub themselves behind the ears a great deal when bad weather is coming, and before rain cats are restless and lie with their backs to the fire. Swallows fly close to the ground before rain.

These are only some of the ways in which we may get an idea of what the weather is likely to be, but there are many other indications, which may be learned by observation; and the studying of the local conditions and the watching of results provide excellent training for the mind and practice for the eye.

OUTDOOR GAMES FOR BOYS

PRISONERS' BASE

THE playground, or part of it, should have four spaces marked off—one in each corner, as seen in the picture. The distance between the prisoners and homes should be not less than 20 yards. The players divide themselves into two parties, A and B, each party selecting a captain. They then go to their separate homes, and one of the captains sends out a man to the place marked in the centre,



where he calls the words, "Chivy, chivy!" Out darts one of the enemy to capture him before he can reach home again. But this pursuer has hardly started when one of Chivy's friends rushes out to catch the pursuer. Thus one after another all the players leave home, but no one must on any account try to touch any boy except the one he left home to follow. Above all, each should not forget that while he is seeking to capture the enemy, another of the enemy is seeking to catch him. This makes matters exciting. A prisoner is made by simply touching a boy; and once this is done the toucher is safe until he has taken his captive to prison. He may then walk home and wait to be ordered out again by his captain. Prisoners are released by one of their own side touching them as he runs by the prison; and if there are many inside, they may join hands and stretch out to meet their friends, so long as the last in the line keeps one foot in prison. The side that succeeds in making all the others prisoners wins the game, but it takes a very clever captain to direct his men so as to manage to do this.

FLY THE GARTER

TO start with, all the players make a running jump, and the one whose jump is shortest has to give a "back" for the others. A chalk line, called the "garter," is drawn, and standing close beside this he bends his back and tucks in his head. When the others have gone over him as in leap-frog, he is told to "foot it"—that is, move away from the line the length of his own foot, and bend down again. This time, in going over, each player must start his jump from the garter, and if all succeed in doing this, the back moves on another foot for the next turn. By and by the distance from the garter becomes too great for one of the jumpers; and the first to make a false leap must take the place of the back, who then joins the others.

FOX IN THE HOLE

THE "fox" stands on a piece of ground marked off for him to live in. He is allowed to carry a knotted handkerchief for self-defense. When the hunters come to attack, he hops out to meet them on one foot.

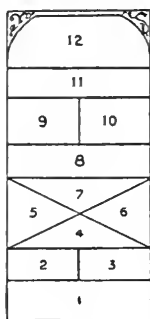
During the battle that follows he must not put his second foot to the ground, or, if he does, he will be basted home again without the right to hit back. If, however, he touches one of the enemy with his knot while hopping, the one so touched is basted by the rest into his home and becomes fox in his stead. While in his home the fox is quite safe from attack.

PEE KU

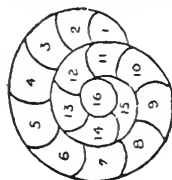
HALF the number of players join hands in a circle, forming what is called a fortress, which the other half seek to take by forcing their way into the middle. The defenders must not loose each other's hands, but may raise them or lower them to stop the attackers getting over or under. They may spread themselves out or draw together in a closer circle when danger is near, and they may change their positions to stop anyone from crawling between their legs. If an enemy gets through, he may assist his friends who are trying to follow him, and when half the number are within the fortress, it must haul down its flag and surrender to the victorious party.

HOPSCOTCH

THE game of hopscotch is played in different ways, but the way which we shall see here is the usual one. We first draw on the pavement of the playground with chalk a plan like this. The larger divisions are



about 2 feet wide. The first player then stands at a short distance and pitches a flat stone or piece of shell into No. 1. If it settles properly in the space, he hops after it and kicks it out again without putting his other foot to the ground. Returning to the starting-place, the shell is again tossed, this time into No. 2, and the player hopping after kicks it out once more, but through No. 1. This action is repeated through every division up to 12, unless the stone settles on a line or is pitched into the wrong division. In either event the player stops, and the next player takes his turn. Though only hopping is allowed, any player who gets as far as No. 8 may rest by putting one foot in No. 5 and one in No. 6, but must go on hopping when he turns to kick the stone out again. On each return journey he may hop and kick as often as he likes, except



when the stone has been tossed in No. 12—or the cat's head, as it is sometimes called. When this is done, he must kick it out at one kick right through all the divisions. If he does so, he has won a game, and his hopping labors are over. In French hop the plan on the pavement is drawn like this. The shell is placed in No. 1, and the hoppers kick it through each division till No. 16 is reached. After a short rest it is kicked back the reverse way to No. 1 and out.

A CLEVER RING-AND-COIN TRICK

THIS is another trick for which you can manufacture the apparatus yourself. Some of the tricks we have explained you may possibly have seen performed by other people, but this is quite a new one, and will be found to puzzle even those wise persons who think they know everything.

Three articles are used in the trick, namely, a piece of blotting-paper, a brass curtain-ring about $1\frac{1}{2}$ inches in diameter, and a round cardboard box of such a size as to fit exactly, but not too tightly, over the ring. An ordinary pill-box or the lid of such a box, if of the right size, will answer the purpose nicely. At starting, all these articles should be lying on a small tray—the box on the paper and the ring beside the box—after the manner shown in the picture.

We will first describe the effect of the trick, and then reveal the secret of how it is done.

We pick up the box, which we explain is intended merely as a cover for the ring, and, handing it to somebody, ask him to make sure that there is no hole in it. While he is examining it, we borrow a nickel, and lay this on the paper by the side of the ring.

When the box is returned to us, we say, "Now watch closely. You see I place this cover over the ring, and then both together over the nickel." In doing this we press the sides of the box a little, so as to lift the ring within it. "Is that fairly done? Are you certain that the nickel is under that cover? If not, I will show it to you once more."

You do so, again lifting the ring within the cover and showing the nickel. "But I have only to touch it with my finger and say 'Presto!' and the nickel will melt away." We lift the cover, but this time we do not press the sides, so that the ring is left behind on the paper. The nickel is gone. We show our hands; we show the cover. Both are alike empty.

We continue, "I see that the gentleman who lent me the nickel is getting anxious about his money, so I will reverse the spell, and bring it back again." Once more cover the ring with the box. "This time I touch it with my thumb."

We do so, again pronouncing some phrase such as "Presto!" by way of a magic spell. Again we lift cover and ring together, and the coin is seen lying on the table, as at first.

How is it done? The deception lies in the brass ring. To this is glued, on the underside, a circular piece of the same sort of paper as that on which it lies, so that instead of being a mere open ring, as everybody naturally takes it to be, it is like a tiny tambourine, if you can fancy one so small.

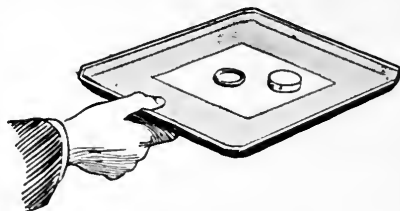
When, therefore, the ring, covered by the box, is brought over the coin, and the box again lifted, leaving the ring behind, the coin is hidden, being covered by the paper attached to the ring. When the cover is once more placed over the ring, and the ring lifted within it, the coin is seen again.

The trick is so surprising that it is sure to be encored, and you agree to do it once more. This time you vary the mode of working a little. Instead of placing ring and cover together over the nickel, you lay the coin inside the ring as it lies on the paper, then cover this with the box, and, lifting

both together, show that the coin has again disappeared, being, in fact, picked up by the closed ring. As the cover, on the occasion of the first disappearance, was clearly shown to be empty, nobody is likely to suspect it now; but you must not allow people too much time to think about the matter. Replacing the box on the paper, and lifting it again without the ring, the coin is made to reappear.

Nobody ever suspects any sort of preparation about the ring. A mere ring, as this appears to be, cannot surely conceal anything whatever. At the same time, the young wizard will find it a good plan to have an ordinary ring to correspond, and let this lie on the paper in the first instance.

He may then bring forward ring, box and paper on the tray for inspection. The tray should be held with thumb above and fingers below, as shown in the picture, the prepared ring being between the fingers and the underside of the tray. In turning round again to place the tray upon the table, he will have ample opportunity to exchange the open ring for the prepared one.



The materials for the ring-and-coin trick.

SIMPLE FOOD EXPERIMENTS—POTATOES

HAVE you ever tried to find out just what potatoes contain? If not, you will find it interesting to follow the directions for these simple experiments. First, pare and grate a piece of raw potato. Then squeeze it in a piece of thin cloth which should be held over a small saucepan. Next rinse that which remains in the cloth with cold water, and squeeze it as dry as you can. What does it seem like?

Second, let the liquid in the dish stand until a white sediment settles; then pour it off very carefully. Add a little water to the sediment and boil it. Have you ever seen anything like it before?

Third, mix 1 teaspoon of laundry starch with 1 tablespoon of cold water, add $\frac{1}{4}$ cup of boiling water, and stir until clear. Do the same with cornstarch. Then dissolve 1 tablespoon of sugar in

$\frac{1}{4}$ cup of water; do the same with 1 tablespoon of salt. Then add a few drops of iodine to each of the starch pastes and the sugar and salt solutions. What happens? You find that the iodine turns the starch pastes blue, and as no other substances are affected this way, iodine serves as a test for starch. You have found by this simple experiment that potatoes contain starch and a woody substance known as cellulose.

Potatoes also contain water. You may wish to find out about how much. If so, pare and weigh a potato. Lay it in a warm dry place, weighing it every day until it loses weight by evaporation of its moisture. Compare the final weight with what it weighed at first. The difference between these shows how much water the potato contains. Use a sensitive scale for weighing.

MAKING A BALL OF MANY COLORS

A CAPITAL ball may be made from a little piece of cardboard and some wool. You can make one as small as a walnut or as big as a football. It all depends upon the size of the card you use. The method for making is the same.

Suppose one just a nice size to handle is wanted. For that a round piece of cardboard 4 inches wide is needed. In the middle of the cardboard cut a hole. This must be quite round, and should be about 1½ inches across. The card should always be about three times as wide as the hole in the middle.

If the ball is to be all one color, unwind a good long piece of wool. Then put one end of it through the hole in the middle of the card. Bring this end up to the edge of the card, and hold it there with the finger. Now go on putting the wool through and through the hole, and binding it round the card. It should not be pulled too tight, nor left too loose. Round and round the card the wool is twisted, each time being put through the hole in the centre.

The hole in the middle will soon become full of wool, so that the end will not easily pass through. For the last few turns you may have to thread the wool through the hole with a needle.

A crochet hook or a thin bodkin is better than an ordinary needle used for sewing, because a point catches in the wool.

When the hole in the middle is quite tight with the wool which has been put through it, take a pair of scissors and cut the wool all around the edge of the card. Each loop of the wool will have

to be cut. Then pull back the pieces, half to one side, and half to the other, so that they are all in a line with the centre. Now tie the wool tightly in the middle with a piece of thin, strong string. Having done that, cut the card with the scissors from the edge down to the middle. It can then be pulled out.

There may be a few ragged edges of the wool to trim off with the scissors to make it look smooth and round, but that is all; the ball is finished.

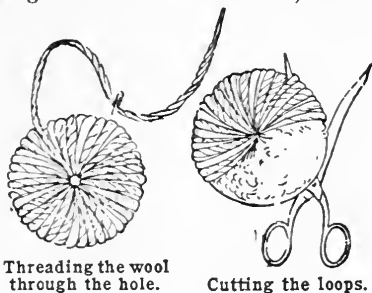
If a ball of different colors is wanted this can easily be done; all you need is to use wools of many colors. First the card is threaded with, say, red wool until it has been covered all the way round. When that one round has been made, cut off the wool which is not wanted, and leave the end level with the edge of the card. Next, blue wool, let us say, may be used for a round, then white, and so on with other colors, until the hole in the card will not let any more pass through.

In this way a very pretty ball can be made. Any sort of wool will do, but the thicker the wool the better and softer the ball.

By sewing odd ends of wool and worsted used for other purposes in the house, a ball can be made without cost. But should wool have to be specially bought for the purpose, quite a big ball can be made for a very few cents. The fact that it is homemade makes

the value of the ball seem greater.

A soft ball of this kind is the best to use in games played in the house, for it cannot do much damage to the furniture.



Threading the wool through the hole.

Cutting the loops.



The wool ball.

AN EASILY MADE STENCIL PLATE

IF we have a design or pattern which we should like to transfer to a book or sheet of paper and use the same pattern over and over again, we can do so by making a stencil plate in the following way, which, for outline designs, is very much simpler than the more elaborate stencil plates described on page 336.

We must lay the drawing we wish to copy upon a sheet of thick paper, such as cartridge paper, and with drawing-pins fasten the two sheets together upon a table or drawing-board. Then with a pin or needle we must prick all over the outline of the design or picture, being very careful that we make the pinholes neat and clean and at fairly even intervals all over the lines.

It is essential that the paper and the picture from which we are making a stencil plate should be pinned down firmly to the drawing-board, and not allowed to move upon one another in the slightest degree while we are pricking the holes, or the outline will not be an exact copy of the picture we are tracing. Whether it is a flower, a bird or an ornamental design, it will, if the paper is allowed to slide about ever so little on the picture, be badly out of proportion. Now let us

remove the drawing-pins and take away the upper picture. We shall find that the clean sheet of paper has the outline of the pattern transferred to it in a series of little holes. To multiply the pattern in a book or upon other paper we have only to pin this perforated sheet down and dust it over with powdered charcoal, a bag of which may be bought at any paint shop for a few cents. The charcoal should be put in a muslin bag and be shaken over the stencil, great care, of course, being taken that the stencil is properly fastened down.

The powdered charcoal will penetrate through the holes in the upper paper and the design will be transferred to the paper or book below. Then we can remove the stencil and ink in the design, or, if we so desire, color it with paint or crayons. The stencil plate can, of course, be used a great number of times; in fact, it will last for a very long time indeed if treated with ordinary care. If we find any difficulty in getting a piece of cartridge or other white paper that is stiff, we can, if we like, use a sheet of brown paper. This, if it is of a smooth nature, will do quite as well as the white, and, being tougher than ordinary white paper, will last very much longer.

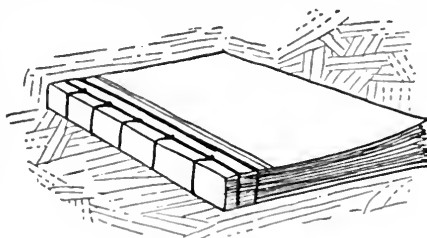
THE STORY OF A BOOK AND HOW TO MAKE IT

HAVE you ever seen a book that was made by the ancient Chinese or Japanese? If you have, you wondered why they had not made it more nearly like the ones you are now using. Of course, you must remember that the first writings which resembled our books were made upon scrolls. These sometimes consisted of long strips of papyrus. This plant, which grew along the river Nile in Egypt, was laid in layers and moistened with sticky water in order that it might be rolled upon sticks, pressed into thin sheets, and polished later with pieces of ivory. Others were made in a similar manner from parchment. This finer writing material, which was made from the skins of goats, sheep and calves, resulted from steeping in lime pits, stretching upon frames, scraping with sharp knives, sprinkling with chalk, and polishing with pumice stone.

In either case these rolls were first unrolled up and down for reading, but later they were read from side to side and from end to end. However, short lines were used later and the mass of written material was broken up into small oblong shapes somewhat resembling our present page-forms. This method of dividing the written material into sections suggested the idea of folding the scroll between these. The strip of papyrus or parchment was then folded backward

and forward giving it the form of an unbound book. The edges later were tied together.

You may easily make the interesting and useful Japanese book which is shown in the accompanying drawing. The directions are as follows: First secure two pieces of cardboard, $3\frac{3}{4}$ inches by $6\frac{3}{4}$ inches for the covers; two pieces of cardboard 1 inch by $6\frac{3}{4}$ inches for laced back; one piece of cloth 4 inches by 14 inches for cover hinge (each of these hinges will be 4 inches by 7 inches); two pieces of colored paper 6 inches by $7\frac{3}{4}$ inches to cover cardboard covers; four pieces of paper $3\frac{1}{2}$ inches by $6\frac{1}{4}$ inches, and two pieces $\frac{3}{4}$ inch by $6\frac{1}{4}$ inches for cover lining; twenty pieces of paper $6\frac{1}{4}$ inches by 11 inches for leaves. Each of these leaves should be folded as follows: Fold one of the short edges of the sheet over one inch and crease the paper. The opposite short edge of the paper is now folded over to this crease. After the pages



The completed book.

and covers have been prepared, they should be punched for the laces. There may then be either an odd or an even number of punched holes. The book is now ready to be laced. A shoe lace or a piece of colored cord will serve the purpose. The leaves are left uncut, as already explained, if you desire a real Japanese book. Otherwise you may cut the leaves and use both sides of each sheet.

THE ANSWERS TO THE PROBLEMS ON PAGE 899

1. Three dozen pens and 5 dozen knives would be the same price as 13 dozen pens, for the knives were double the price of the pens. Three dozen knives and 5 dozen pens would be the same price as 11 dozen pens. The difference in price between 13 dozen pens and 11 dozen pens was \$2.88, so 2 dozen pens cost \$2.88, or 1 pen cost 12 cents and 1 knife cost 24 cents, or twice the price of a pen. The work may be proved. Three dozen pens at \$1.44 a dozen and 5 dozen at \$2.88 a dozen come to \$18.72; 3 dozen knives at \$2.88 and 5 dozen pens at \$1.44 would have cost \$15.84, and the difference is \$2.88.

2. The express train takes 1 hour to travel 40 miles, and the excursion train takes 1 hour and 20 minutes to travel 40 miles. By the express train the fare is $\frac{1}{2}$ cent per mile more, or 20 cents for 40 miles, and the saving in time is 20 minutes. The traveler finds that the saving in time is just equal to the extra charge, so that his time is worth 20 cents for each 20 minutes, or 60 cents per hour.

3. One-quarter added to one-third is seven-twelfths, and the difference between seven-twelfths and one-half, which is six-twelfths, is one-twelfth of the whole. This difference was 10 marbles, so that the total number of marbles must have been 120, or 12×10 marbles. We can prove the answer by adding one-quarter and one-third, which makes $\frac{7}{12}$, and this is 10 more than half the marbles.

4. Harry began at the end and found that 3 is the only figure which when multiplied into 215

gives 4 in the second figure, so that the third figure in the quotient was 3. As the first figure in the quotient is 1, the line below the dividend is 215. The first figure in the dividend must be a 3, because when 2 is subtracted from it something remains. This gives the first remainder as 15×9 . Obviously the middle figure in the quotient must be 7, and the second multiple in the sum must therefore be 1505. The figure below the 0 is 6, so that the figure above it must also be 6, and the middle figure in the dividend must be 1. Thus the entire sum is like this:

$$\begin{array}{r} 215 \overline{) 37195} \\ \underline{215} \\ 1569 \\ \underline{1505} \\ 645 \\ \underline{645} \\ 0 \end{array}$$

5. Hicks walked for 9 days, and as he walked 117 miles altogether, his average was 13 miles. As his increase was regular each day, he must have walked the exact average on the middle day—namely, the 5th day. Thus on the 6th, 7th, 8th and 9th days he must have walked 14, 15, 16 and 17 miles, and on the 4th, 3d, 2d, and 1st days he must have walked 12, 11, 10 and 9 miles. These figures total 117 miles.

6. The word "united," which is "untied" with the two middle letters transposed.

THE NEXT THINGS TO MAKE AND TO DO ARE ON PAGE 1283

